7 Receiver characteristics

TBD

7.1 General

Unless otherwise stated the receiver characteristics are specified at the antenna connector(s) of the UE. For UE(s) with an integral antenna only, a reference antenna(s) with a gain of 0 dBi is assumed for each antenna port(s). UE with an integral antenna(s) may be taken into account by converting these power levels into field strength requirements, assuming a 0 dBi gain antenna. For UEs with more than one receiver antenna connector, identical interfering signals shall be applied to each receiver antenna port if more than one of these is used (diversity).

The levels of the test signal applied to each of the antenna connectors shall be as defined in the respective clauses below.

Unless otherwise stated, Channel Bandwidth shall be prioritized in the selecting of test points. Subcarrier spacing shall be selected after Test Channel Bandwidth is selected.

The applicability of receiver requirements for Band n90 is in accordance with that for Band n41; a UE supporting Band n90 shall meet the minimum requirements for Band n41.

With the exception of clause 7.3, the requirements shall be verified with the network signalling value NS_01 configured (Table 6.2.3.3-1).

All the parameters in clause 7 are defined using the UL reference measurement channels specified in Annexes A.2.2 and A.2.3, the DL reference measurement channels specified in Annex A.3.2 and A.3.3, and using the set-up specified in Annex C.3.1.

The minimum requirements specified in clauses 7.5, 7.6, 7.7 and 7.8 for NR band n48 refer to the minimum requirements for NR bands < 2.7 GHz.

For the additional requirements for intra-band non-contiguous carrier aggregation of two or more sub-blocks, an in-gap test refers to the case when the interfering signal is located at a negative offset with respect to the assigned lowest channel frequency of the highest sub-block and located at a positive offset with respect to the assigned highest channel frequency of the lowest sub-block.

For the additional requirements for intra-band non-contiguous carrier aggregation of two or more sub-blocks, an out-ofgap test refers to the case when the interfering signal(s) is (are) located at a positive offset with respect to the assigned channel frequency of the highest carrier frequency, or located at a negative offset with respect to the assigned channel frequency of the lowest carrier frequency.

For the additional requirements for intra-band non-contiguous carrier aggregation of two or more sub-blocks with channel bandwidth larger than or equal to 5 MHz, the existing adjacent channel selectivity requirements, in-band blocking requirements (for each case), and narrow band blocking requirements apply for in-gap tests only if the corresponding interferer frequency offsets with respect to the two measured carriers satisfy the following condition in relation to the sub-block gap size W_{gap} for at least one of these carriers j = 1,2, so that the interferer frequency position does not change the nature of the core requirement tested:

Wgap $\geq 2 \cdot |\text{FInterferer (offset})_{j}| - BWChannel(_{j})$

where $F_{\text{Interferer (offset)},j}$ for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier *j* as specified in clause 7.5, clause 7.6.2 and clause 7.6.4 for the respective requirement and BW_{Channel(j)} the channel bandwidth of carrier *j*. F_{Interferer (offset),j} for a sub-block with two or more contiguous component carriers is the interference frequency offset with respect to the carrier adjacent to the gap is specified in clause 7.5A, 7.6A.2 and 7.6A.3. The interferer frequency offsets for adjacent channel selectivity, each in-band blocking case and narrow- band blocking shall be tested separately with a single in-gap interferer at a time.

7.1A General

The minimum requirements for band combinations including Band n41 also apply for the corresponding band combinations with Band n90 replacing Band n41 but with otherwise identical parameters. For brevity the said band combinations with Band n90 are not listed in the tables below but are covered by this specification.

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The minimum requirements specified in clauses 7.5A, 7.6A, 7.7A and 7.8A for NR band n48 refer to the minimum requirements for NR bands < 2.7 GHz.

7.11 General

For a Redcap UE the requirements in Section 7 shall be verified with the channel bandwidth up to 20MHz and REFSENS specified in clause 7.3I.

7.2 Diversity characteristics

The UE is required to be equipped with a minimum of two Rx antenna ports in all operating bands except for the bands n7, n38, n41, n77, n78, n79 where the UE is required to be equipped with a minimum of four Rx antenna ports. An exception is allowed for two Rx vehicular UE to be equipped with a minimum of two Rx antenna ports in bands n7, n38, n41, n77, n78, n79. This requirement applies when the band is used as a standalone band or as part of a band combination.

For the single carrier REFSENS requirements in clause 7, the UE shall be verified with two Rx antenna ports in all supported frequency bands, additional requirements for four Rx ports shall be verified in operating bands where the UE is equipped with four Rx antenna ports.

For Rx requirements other than single carrier REFSENS in Clause 7, the UE shall be verified with four Rx antenna ports and skip two Rx antenna ports requirements in operating bands where the UE is equipped with four Rx antenna ports, otherwise, the UE shall be verified with two Rx antenna ports.

The above rules apply for all subclasses with the exception of clause 7.9.

For a Redcap UE the requirements in Section 7 assume that the receiver is equipped with a minimum of single Rx antenna port.

7.3 Reference sensitivity

7.3.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

In later clauses of Clause 7 where the value of REFSENS is used as a reference to set the corresponding requirement:

In all bands, the UE shall be verified against those requirements by applying the REFSENS value in Table 7.3.2.3-1a, Table 7.3.2.3-1b and Table 7.3.2.3-1c or Table 7.3.2.3-1d with 2 Rx antenna ports tested;

For bands where the UE is required to be equipped with 4 Rx antenna ports, the UE shall additionally be verified against those requirements by applying the resulting REFSENS value derived from the requirement in Table 7.3.2.3-2 with 4 Rx antenna ports tested.

7.3.2 Reference sensitivity power level

7.3.2.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

7.3.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward.

7.3.2.3 Minimum conformance requirements

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2.3-1a, 7.3.2.3-1b, Table 7.3.2-1c, Table 7.3.2-1d and Table 7.3.2.3-2.

Table 7.3.2.3-1a: Two antenna port reference sensitivity QPSK PREFSENS for FDD bands

	1	E					andwidth		40		EA
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	35 MHz (dBm)	40 MHz (dBm)	45 MHz (dBm)	50 MHz (dBm)
	15	-100.0	-96.8	-95.0	-93.8	-92.7	-91.9		-90.6	-90.1	-89.6
n1	30		-97.1	-95.1	-94.0	-92.8	-92.0		-90.7	-90.2	-89.7
	60		-97.5	-95.4	-94.2	-93.0	-92.1		-90.9	-90.3	-89.7
	15	-98	-94.8	-93	-91.8	-90.7	-84.1		-81.5		
n2	30		-95.1	-93.1	-92	-90.8	-84.2		-81.6		
	60	07.0	-95.5	-93.4	-92.2	-90.9 -89.7	-84.3	06.0	-81.7	01.0	70.7
n3	15 30	-97.0	-93.8 -94.1	-92.0 -92.1	-90.8 -91.0	-89.7	-88.9 -89.0	-86.2 -86.3	-82.3 -82.4	-81.3 -81.4	-79.7 -79.8
115	60		-94.1	-92.1	-91.2	-90.0	-89.0	-86.4	-82.6	-81.5	-79.9
	15	-98.0	-94.8	-93.0	-86.8	-84.8	-03.1	-00.4	-02.0	-01.5	-13.3
n5	30	30.0	-95.1	-93.1	-88.6	-84.9					
	15	-98.0	-94.8	-93.0	-91.8	0 110					
n71	30		-95.1	-93.1	-92.0						
	60		-95.5	-93.4	-92.2						
~ 0	15	-97.0	-93.8	-91.4	-85.8			-78.4			
n8	30		-94.1	-91.7	-87.2			-78.5			
n12	15	-97.0	-93.8	-84.0							
1112	30		-94.1	-84.1							
n14	15	-97.0	-93.8								
	30		-94.1								
n20	15	-97.0	-93.8	-91.0	-89.8					-	
_	30	400.0	-94.1	-91.1	-90.0						
524	15 30	-100.0	-96.8								
n24	60		-97.1 -97.5								
	15	-96.5	-97.5	-91.5	-90.3	-89.3	-82.2		-79.5		
n25	30	-90.5	-93.6	-91.6	-90.5	-89.4	-82.3		-79.6		
1120	60		-94.0	-91.9	-90.7	-89.6	-82.4		-79.7		
	15	-97.5 ⁶	-94.5 ⁶	-92.7 ⁶	-87.6	00.0	02.1		10.1		
n26	30		-94.8 ⁶	-92.7 ⁶	-87.7						
- 20	15	-98.5	-95.5	-93.5	-90.8		-78.5				
n28	30		-95.6	-93.6	-91.0		-78.6				
n30	15	-99.0	-95.8								
1130	30		-96.1								
	15	-99.5	-96.3	-94.5	-93.3						-89.2
n65	30		-96.6	-94.6	-93.5						-89.3
	60		-97.0	-94.9	-93.7						-89.4
	15	-99.5	-96.3	-94.5	-93.3	-92.2	-91.4		-90.1	-89.6	
n66	30		-96.6	-94.6	-93.5	-92.3	-91.5		-90.2	-89.7	
	60 15	-100.0	-97.0 -96.8	-94.9 -95.0	-93.7 -93.8	-92.5 -92.7	-91.6		-90.4	-89.8	
n70	30	-100.0	-96.8	-95.0	-93.8	-92.7					
1170	60		-97.1	-95.1	-94.0	-92.0					
	15	-97.2	-94.0	-91.6	-86.0	55.0	+				
n71	30	01.2	-94.3	-91.9	-87.4						
	15	-99.5 ³	-96.3 ³	-94.5 ³	-89.3 ³		1				
n74	30		-96.6 ³	-94.6 ³	-89.5 ³		1				
	60		-97.0 ³	-94.9 ³	-89.6 ³						
IOTE 1: Four IOTE 2: The IOTE 3: The IOTE 4: Void IOTE 5: Void IOTE 6: Valu	transmitter requireme	shall be se nt is modifie	t to Р _{UMAX} as d by -0.5 dE	s defined in 3 when the a	clause 6.2.4 assigned NF	4 R channel ba	andwidth is o	confined with		9 - 1510.9 N	1Hz.

		Operating band / SCS / Channel bandwid	th / REFSENS								
Operating	SCS	Channel bandwidth (MHz)	REFSENS (dBm) ⁸	Duplex							
band	kHz		, , ,	Mode							
	15	5, 10, 15	-100 + 10log ₁₀ (N _{RB} /25)	-							
n34	30	10, 15	-97.1 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	10, 15	-97.5 + 10log ₁₀ (N _{RB} /11)								
	15	5, 10, 15, 20, 25, 30, 40	-100 + 10log ₁₀ (N _{RB} /25)								
n38¹	30	10, 15, 20, 25, 30, 40	-97.1 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	10, 15, 20, 25, 30, 40	-97.5 + 10log ₁₀ (N _{RB} /11)								
	15	5, 10, 15, 20, 25, 30, 40	-100 + 10log ₁₀ (N _{RB} /25)								
n39	30	10, 15, 20, 25, 30, 40	-97.1 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	10, 15, 20, 25, 30, 40	$-97.5 + 10\log_{10}(N_{RB}/11)$								
40	15	5, 10, 15, 20, 25, 30, 40, 50	-100 + 10log ₁₀ (N _{RB} /25)	TDD							
n40	30	10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	-97.1 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	-97.5 + 10log ₁₀ (N _{RB} /11)								
- 441	15	10, 15, 20, 30, 40, 50	$-94.8 + 10\log_{10}(N_{RB}/50)$	тор							
n41 ¹	30	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100	$-95.1 + 10\log_{10}(N_{RB}/24)$	TDD							
	60	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100	$-95.5 + 10\log_{10}(N_{RB}/11)$								
	15	5, 10, 15, 20, 30, 40, 50 ⁵	-99 + 10log ₁₀ (N _{RB} /25)	-							
n481	30	10, 15, 20, 30, 40, 50 ⁵ , 60 ⁵ , 70 ⁵ , 80 ⁵ , 90 ⁵ , 100 ⁵	-96.1 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	10, 15, 20, 30, 40, 50 ⁵ , 60 ⁵ , 70 ⁵ , 80 ⁵ , 90 ⁵ , 100 ⁵	-96.5 + 10log ₁₀ (N _{RB} /11)								
	15	5, 10, 15, 20, 30, 40, 50	-100 + 10log ₁₀ (N _{RB} /25)								
n50	30	10, 15, 20, 30, 40, 50, 60, 80	-97.1 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	60 10, 15, 20, 30, 40, 50, 60, 80 -97.5 + 10log ₁₀ (N _{RB} /11)									
n51	15	5	-100	TDD							
	15	5, 10	-100 + 10log10(N _{RB} /25)								
n53	30	10 -97.1									
	60	10	-97.5								
	15	5,10,15,20	-100 + 10log ₁₀ (N _{RB} /25)								
n75 ⁷	30	10,15,20	-97.1 + 10log ₁₀ (N _{RB} /24)	SDL							
	60	10,15,20	-97.5 + 10log ₁₀ (N _{RB} /11)								
n76 ⁷	15	5	-100	SDL							
	15	10, 15, 20, 40, 50	-95.3 + 10log ₁₀ (N _{RB} /50)								
n77 ^{1,4}	30	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-95.6 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-96.0 + 10log ₁₀ (N _{RB} /11)								
	15	10, 15, 20, 40, 50	-95.8 + 10log ₁₀ (N _{RB} /50)								
en78 ¹	30	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-96.1 + 10log ₁₀ (N _{RB} /24)	TDD							
	60	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-96.5 + 10log ₁₀ (N _{RB} /11)								
1	15	40, 50	-89.6 + 10log ₁₀ (N _{RB} /216)								
n79 ¹	30	40, 50, 60, 80, 100	-89.7 + 10log ₁₀ (N _{RB} /106)	TDD							
	60	40, 50, 60, 80, 100 antenna ports shall be the baseline for this opera	-89.9 + 10log ₁₀ (N _{RB} /51)								
	UE.	antenna ports snall be the baseline for this opera	ating band except for two RX	venicular							
	-	smitter shall be set to PUMAX as defined in clause	6.2.4.								
NOTE 3:	Void										
		irement is modified by -0.5 dB when the assigne 00 - 3800 MHz.	ed UE channel bandwidth is c	onfined							
NOTE 5:	For these	e bandwidths, the minimum requirements are res ad as a downlink carrier part of CA configuration.		rier is							
NOTE 6:	0	a a downlink carrier part of CA configuration.									
		bands, the reference sensitivity requirements sh	all be verified by inter-band (Δ							
NOTE 8:	combinations with SDL band, which are supported by UE. The REFSENS value is rounded to the nearest number down to one decimal point. " N_{RB} " in REFSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1.										

Table 7.3.2.3-1b: Two antenna port reference sensitivity QPSK PREFSENS for TDD, SDL and FDDwith variable duplex operation bands

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For power class 2 UEs, certain degradation of the reference sensitivity in Table 7.3.2.3-1a is allowed. The maximum amount of degradation is specified in Table 7.3.2.3-1c, and in Table 7.3.2.3-1d for a UE that indicates *txDiversity-r16* [26].

Table 7.3.2.3-1c Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for UE not supporting Tx Diversity

Operating Band	5 MHz (dB)	10 MHz (dB)	15 MHz (dB)	20 MHz (dB)	25 MHz (dB)	30 MHz (dB)	35 MHz (dB)	40 MHz (dB)	45 MHz (dB)	50 MHz (dB)		
n1	0	0	0	0	0	0	-	0	0	0		
n3	0.5	0.5	0.5	0.5	0.6	0.8	1.1	1.5	2.3	2.8		
NOTE 1: TI	NOTE 1: The transmitter shall be set to PUMAX as defined in clause 6.2.4											

Table 7.3.2.3-1d Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for UE supportingTx Diversity

Operating Band	5 MHz (dB)	10 MHz (dB)	15 MHz (dB)	20 MHz (dB)	25 MHz (dB)	30 MHz (dB)	35 MHz (dB)	40 MHz (dB)	45 MHz (dB)	50 MHz (dB)	
n1	0	0	0	0	0	0	-	0	0	0	
n3	1.4	1.5	1.5	1.5	1.6	1.7	2.8	[5]	[5.5]	[6.0]	
NOTE 1: TI	NOTE 1: The transmitter shall be set to PUMAX as defined in clause 6.2G.4										

For UE(s) equipped with 4 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3.2.3-1a and in Table 7.3.2.3-1b shall be modified by the amount given in $\Delta R_{IB,4R}$ in Table 7.3.2.3-2 for the applicable operating bands.

Table 7.3.2.3-2: Four antenna port reference sensitivity allowance $\Delta R_{IB,4R}$

Operating band	ΔR IB,4R (dB)
n8, n28, n71	-2.7 ¹
n1, n2, n3, n30, n40, n7, n34, n38, n39, n41, n66, n70	-2.7
n48, n77, n78, n79	-2.2
NOTE 1: 4 Rx operation is targete	ed for FWA form factor

The reference sensitivity (REFSENS) requirement specified in Table 7.3.2.3-1a, Table 7.3.2.3-1b, Table 7.3.2.3-1c, Table 7.3.2.3-1d and Table 7.3.2.3-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-3.

Table 7.3.2.3-3: Uplink configuration for reference sensitivity

	T	Operating band / SCS (kHz) / Channel bandwidth (MHz) / Duplex mode													
cs	5	10	15	20	25	30	35	40	45	50	60	70	80	90	10
15	25	50 ¹	75 ¹	100 ¹	128 ¹	128 ¹		128 ¹	128 ¹	128 ¹					
30		24	36 ¹	50 ¹	64 ¹	64 ¹		64 ¹	64 ¹	64 ¹				<u> </u>	
60		10 ¹	18	24	30 ¹	30 ¹		30 ¹	30 ¹	30 ¹				L	
15	25	50 ¹	50 ¹	50 ¹	50 ¹	48 ¹		40 ¹						ļ	
30	10 ¹	24	24 ¹	24 ¹	24 ¹	24 ¹		20 ¹						L	
60		10 ¹	10 ¹	10 ¹	10 ¹	10 ¹	1	10 ¹	1					 	
15	25	50 ¹	50 ¹	50 ¹	50 ¹	50 ¹	50 ¹	50 ¹	50 ¹	50 ¹				 	
30		24	24 ¹	24 ¹	24 ¹	24 ¹	24 ¹	24 ¹	24 ¹	24 ¹				 	
60	05	10 ¹	10 ¹	10 ¹	10 ¹	10 ¹	10 ¹	10 ¹	10 ¹	10 ¹				<u> </u>	
15	25	25 ¹	25 ¹	25 ¹	Note 5									<u> </u>	
30	05	10 ¹	10 ¹	10 ¹	Note 5					-				 	
15	25	50 ¹	75 ¹	75 ¹											
30		24	36 ¹	36 ¹											
60 1 F	05	10 ¹	18 25 ¹	18 ¹			Nata C								
15 30	25	25 ¹ 10 ¹	25 ¹ 10 ¹	25 ¹ 10 ¹			Note 5 Note 5								
	20 ¹	20 ¹	20 ¹	10.			Note 5		-				-		
15 30	20.	20 ¹	10 ¹	+					+	+	ł		+		
30 15	20 ¹	20 ¹	10.	+					+	+	ł		+		
30	20	10 ¹		1							+		+		
50 15	25	20 ¹	20 ²	20 ²									+		
30	20	10 ¹	10 ²	10 ²											
15	25	50	10	10											
30	20	24													
60		10													
15	25	50 ¹	50 ¹	50 ¹	50 ¹	48 ¹		40 ¹							
30	20	24	24 ¹	24 ¹	24 ¹	24 ¹		20 ¹							
60		10 ¹	10 ¹	10 ¹	10 ¹	10 ¹		10 ¹							
15	25	25 ¹	25 ¹	25 ¹	10	10		10							
30		12 ¹	12 ¹	12 ¹											
15	25	25 ¹	25 ¹	25 ¹		25 ¹									
30		10 ¹	10 ¹	10 ¹		<u>10</u> ¹									
15	20 ¹	20 ¹													
30	-	10 ¹													
15	25	50	75												
30		24	36												
60		10	18												
15	25	50	75	100	128	160		216							
30		24	36	50	64	75		100							
60		10	18	24	30	36		50							
15	25	50	75	100	128	160		216							
30		24	36	50	64	75		100							
60		10	18	24	30	36		50							
15	25	50	75	100	128	160		216		270					
30		24	36	50	64	75		100		128	162		216		
60		10	18	24	30	36		50		64	75		100		
15		50	75	100		160		216		270				ļ	
30		24	36	50		75		100		128	162	180	216f	243	27
60		10	18	24		36		50		64	75	90	100	120	13
15	25	50	75	100		160		216						 	
30		24	36	50		75		100						ļ	
60	ļ	10	18	24		36		50	ļ				ļ	 	
15	25	50	75	100		160		216	ļ	270			<u> </u>	 	
30		24	36	50		75		100		128	162		Note 3		
60		10	18	24		36		50		64	75		Note 3		
15	25	F 2													
15	25	50												 	
30		24												 	
60		10												<u> </u>	1

			C	perating b	band / SCS	6 (kHz) /	Channel	bandwidth	(MHz) / D	uplex mod	е				
cs	5	10	15	20	25	30	35	40	45	50	60	70	80	90	10
15	25	50 ¹	75 ¹	100 ¹											
30		24	36 ¹	50 ¹											
60		10 ¹	18	24											
15	25	50 ¹	75 ¹	100 ¹	128 ¹	160		216							
30		24	36 ¹	50 ¹	64 ¹	75 ¹		100 ¹							
60		10 ¹	18	24	30 ¹	36 ¹		50 ¹							
15	25	50 ¹	75 ¹	Note 3	Note 3										
30		24	36 ¹	Note 3	Note 3										
60		10 ¹	18	Note 3	Note 3										
15	25	25 ¹	20 ¹	20 ¹											
30		12 ¹	10 ¹	10 ¹											
15	25	25 ¹	25 ¹	25 ¹											
30		10 ¹	10 ¹	10 ¹											
60		5 ¹	5 ¹	5 ¹											
15		50	75	100				216		270					
30		24	36	50				100		128	162	180	216	243	27
60		10	18	24				50		64	75	90	100	120	13
15		50	75	100				216		270					
30		24	36	50				100		128	162	180	216	243	27
60		10	18	24				50		64	75	90	100	120	13
15								216		270			1		
30								100		128	162		216		27
60				1				50		64	75		100		13

urce blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the c . .3.2-1).

d 20; for 15kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20MHz channe urce blocks shall be located at RB_{start} 16; for 30kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 6 channel bandwidth, the UL resource blocks shall be located at RB_{start} 8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource block at RB_{start} 3 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 4.

hannel bandwidths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest duplex distance shall be used.

DL channel bandwidth, the UL configuration of the highest UL channel bandwidth specified in Table 5.3.6-1 and the default Tx-Rx frequency separatio 4.4-1 shall be used.

Unless given by Table 7.3.2.3-4, the minimum requirements specified in Tables 7.3.2.3-1a, Tables 7.3.2.3-1b, Tables 7.3.2.3-1c, Tables 7.3.2.3-1d shall be verified with the network signalling value NS_01 (Table 6.2.3.3-1) configured.

Table 7.3.2.3-4: Network signalling value for reference sensitivity

Operating band	Network Signalling value
n2	NS_03
n12	NS_06
n14	NS_06
n24	NS_56
n25	NS_03
n30	NS_21
n48	NS_27
n53	NS_45
n66	NS_03
n70	NS_03
n71	NS_35

For the UE which supports inter-band carrier aggregation, the minimum requirement for reference sensitivity in Table 7.3.2.3-1 shall be increased by the amount given in $\Delta R_{IB,c}$ defined in subclause 7.3.3 for the applicable operating bands.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.3.2.

7.3.2.4 Test description

7.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3 The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

			Initial Conditions								
Test Envir	Test Environment as specified in TS 38.508-1 Normal, TL/VL, TL/VH, TH/VL, TH/VH [5] subclause 4.1 Test Frequencies as specified in TS 38.508-1 [5] Low range, Mid range, High range (NOTE 4)										
[5] subclau	use 4.1										
Test Frequ	uencies as specified	1 in TS 38.508-1 [5]	Low range, Mid range, High range (NOTE 4)								
subclause	4.3.1										
	nel Bandwidths as	specified in TS	Lowest, Mid, Highest								
38.508-1 [5] subclause 4.3.1		Lowest UL / Lowest DL, Lowest UL / High	ghest DL (NOTE 3)							
Test SCS	as specified in Tab	e 5.3.5-1	Lowest								
			Test Parameters								
Test ID	Downlink	Downlink Configuration Uplink Configuration									
	Modulation RB allocation Modulation RB allocation										
1	CP-OFDM Full RB (NOTE 1) DFT-s-OFDM QPSK REFSENS (NOTE 2)										
	QPSK										
NOTE 1:	Full RB allocation s	shall be used per eac	h SCS and channel BW as specified in T	able 7.3.2.4.1-2.							
NOTE 2:	REFSENS refers to	o Table 7.3.2.4.1-3 w	hich defines uplink RB configuration and	start RB location for each							
	SCS, channel BW	and NR band.									
NOTE 3:			g to asymmetric channel bandwidths spec	cified in clause 5.3.6. DL							
	channel bandwidth	shall be selected fire	st.								
NOTE 4:	For NR band n28, 30MHz test channel bandwidth is tested with Low range and High range test										
	frequencies.										
NOTE 5:			est needs to be repeated with only 2Rx a	ntennas connected and							
	the other antennas	terminated.									

Table 7.3.2.4.1-1: Test Configuration Table

Table 7.3.2.4.1-2: Downlink Configuration of each RB allocation

Channel Bandwidth	SCS(kHz)	LCRBmax	Outer RB allocation / Normal RB allocation
	15	25	25@0
5MHz	30	11	11@0
	60	N/A	N/A
	15	52	52@0
10MHz	30	24	24@0
	60	11	11@0
	15	79	79@0
15MHz	30	38	38@0
	60	18	18@0
	15	106	106@0
20MHz	30	51	51@0
	60	24	24@0
	15	133	133@0
25MHz	30	65	65@0
	60	31	31@0
	15	160	160@0
30MHz	30	78	78@0
	60	38	38@0
	15	188	188@0
35MHz	30	92	92@0
	60	44	38@0
	15	216	216@0
40MHz	30	106	106@0
	60	51	51@0
	15	128	128@0
45MHz	30	64	64@0
	60	30	30@0
	15	270	270@0
50MHz	30	133	133@0
0011112	60	65	65@0
	15	N/A	N/A
60MHz	30	162	162@0
	60	79	79@0
	15	79 N/A	N/A
70MHz	15 30	189	189@0
7 01011 12	60	93	93@0
	15	93 N/A	93@0 N/A
80MHz	30	217	
ουινιπΖ			217@0
	60	107 N//A	107@0
000411-	15	N/A	N/A
90MHz	30	245	245@0
	60	121	121@0
100MHz	15	N/A	N/A

	30	273	273@0						
	60	135	135@0						
	NOTE 1: Test Channel Bandwidths are checked separately for each								
N	NR band, the applicable channel bandwidths are specified in								
Ta	able 5.3.5-1.								

Table 7.3.2.4.1-3: Uplink configuration for reference sensitivity, LCRB @ RBstart format

3GPP TS 38.521-1 V17.6.1 (2022-10)

10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	35 MHz	40 MHz	45 MHz	50 MHz	60 MHz	70 MHz	80 MHz
50@2 ¹	75@4 ¹	100@61	128@5 ¹	128@32 ¹	1411 12	128@88 ¹	128@114 ¹	128@142 ¹	1411 12	111112	1911 12
24@0	36@2 ¹	50@1 ¹	64@1 ¹	64@14 ¹		64@42 ¹	64@551	64@69 ¹			
10@1 ¹	18@0	24@0	30@1 ¹	30@8 ¹		30@21 ¹	30@28 ¹	30@35 ¹			
50@2 ¹	50@29 ¹	50@56 ¹	50@83 ¹	48@1121		40@176 ¹					
24@0	24@141	24@27 ¹	24@41 ¹	24@541		20@86 ¹					
10@1 ¹	10@8 ¹	10@14 ¹	10@21 ¹	10@28 ¹		10@41 ¹					
50@21	50@29 ¹	50@56 ¹	50@83 ¹	50@1101	50@1381	50@166 ¹	50@1921	50@2201			
24@0	24@14 ¹	24@27 ¹	24@41 ¹	24@541	24@681	24@82 ¹	24@95 ¹	24@1091			
10@1 ¹	10@8 ¹	10@14 ¹	10@21 ¹	10@28 ¹	10@34 ¹	10@41 ¹	10@48 ¹	10@551			
25@27 ¹	25@54 ¹	25@81 ¹	Note 5								
10@14 ¹	10@28 ¹	10@41 ¹	Note 5								
50@21	75@4 ¹	75@31 ¹									
24@0	36@21	36@15 ¹									
10@1 ¹	18@0	18@6 ¹									
25@27 ¹	25@541	25@81 ¹			Note 5						
10@14 ¹	10@28 ¹	10@41 ¹			Note 5						
20@321	20@59 ¹										
10@14 ¹	10@28 ¹										
20@01											
10@0 ¹											
20@01	20@11 ²	20@16 ²									
10@01	10@6 ²	10@8 ²									
50@0											
24@0											
10@0											
50@0	50@29 ¹	50@56 ¹	50@83 ¹	48@112 ¹		40@176 ¹					
24@0	24@14 ¹	24@27 ¹	24@41 ¹	24@54 ¹		20@86 ¹					

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10@0	10@8 ¹	10@14 ¹	10@21 ¹	10@28 ¹	10@41 ¹				
25@27 ¹	25@54 ¹	25@81 ¹							
12@12 ¹	12@26 ¹	12@39 ¹							
25@27 ¹	25@54 ¹	25@81 ¹		25@135 ¹					
10@14 ¹	10@28 ¹	10@41 ¹		10@68 ¹					
20@321									
10@14 ¹									
50@0	75@0								
24@0	36@0								
10@0	18@0								
50@0	75@0	100@0	128@0	160@0	216@0				
24@0	36@0	50@0	64@0	75@0	100@0				
10@0	18@0	24@0	30@0	36@0	50@0				
50@0	75@0	100@0	128@0	160@0	216@0				
24@0	36@0	50@0	64@0	75@0	100@0				
10@0	18@0	24@0	30@0	36@0	50@0				
50@0	75@0	100@0	128@0	160@0	216@0	270@0			
24@0	36@0	50@0	64@0	75@0	100@0	128@0	162@0		216@0
10@0	18@0	24@0	30@0	36@0	50@0	64@0	75@0		100@0
50@0	75@0	100@0		160@0	216@0	270@0			
24@0	36@0	50@0		75@0	100@0	128@0	162@0	180@0	216@0
10@0	18@0	24@0		36@0	50@0	64@0	75@0	90@0	100@0
50@0	75@0	100@0		160@0	216@0				
24@0	36@0	50@0		75@0	100@0				
10@0	18@0	24@0		36@0	50@0				
50@0	75@0	100@0			216@0	270@0			
24@0	36@0	50@0			100@0	128@0	162@0		NOTE 3
10@0	18@0	24@0			50@0	64@0	75@0		NOTE 3

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	50@0	<u> </u>	'	I	<u> </u>			 		<u> </u>	1
	24@0	'							!		
	10@0	<u> </u>							<u> </u>		
	50@21	75@4 ¹	100@6 ¹						<u> </u>		
	24@0	36@2 ¹	50@1 ¹						Τ'		
	10@1 ¹	18@0	24@0	Ţ						1	I I I
	50@21	75@4 ¹	100@6 ¹	128@5 ¹	160@0	2160	@0			1	i I
	24@0	36@2 ¹	50@1 ¹	64@1 ¹	75@3 ¹	100@	₫6 ¹			1	· /
	10@1 ¹	18@0	24@0	30@1 ¹	36@2 ¹	50@	⊉1 ¹			1	ı Т
	50@21	75@4 ¹	NOTE 3	NOTE 3						1	i I
	24@0	36@2 ¹	NOTE 3	NOTE 3						1	i I
	10@1 ¹	18@0	NOTE 3	NOTE 3						1	ı Т
	25@01	20@01	20@01							1	ı Т
	12@01	10@01	10@01							1	1
	, I		· · · · · · · · · · · · · · · · · · ·		[1 1	1	1
	25@27 ¹	25@54 ¹	25@81 ¹							1	1
	10@14 ¹	10@28 ¹	10@41 ¹							1	1
	5@61	5@13 ¹	5@19 ¹							1	1
	50@0	75@0	100@0			2160	@0	270@0		1	1
	24@0	36@0	50@0			100@	@0	128@0	162@0	180@0	216@0
	10@0	18@0	24@0			50@	<u>2</u> 0	64@0	75@0	90@0	100@0
	50@0	75@0	100@0	ļ		2160	@0	270@0		1	1
	24@0	36@0	50@0			100@	@0	128@0	162@0	180@0	216@0
	10@0	18@0	24@0	ļ		50@	<u>v</u> 0	64@0	75@0	90@0	100@0
	, 	1		ļ		2160	@0	270@0		1	,
	1	1		ļ		100@	@0	128@0	162@0	1	216@0
	I			,		50@	<u>)</u> 0	64@0	75@0		100@0
_								 			

all be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1).

z SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart 16; for 30k vidth, the UL resource blocks shall be located at RBstart 6 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart 8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 3 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart 8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 8; for 60kHz SCS, in the case of 15MHz channel bandwi

idths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest duplex distance shall be used.

indwidth, the UL configuration of the highest UL channel bandwidth specified in Table 5.3.6-1 and the default Tx-Rx frequency separation specified in Table 5.4.4-1 shall be used.

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and Reference Measurement Channel is set according to Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3.2.4.3.

7.3.2.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.3.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.3.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3.2.5-1 if 2Rx antennas connected or Table 7.3.2.5-2 if 4Rx antennas connected. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits PUMAX level for at least the duration of the Throughput measurement.
- 4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2

7.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6 ensuring Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED for NR band.

Message contents are according to TS 38.508-1[5] subclause 4.6 with the following exceptions for each network signalling value.

7.3.2.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 38.508-1 [5] subclause 4.6 can be used without exceptions.

7.3.2.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.2.4.3.2-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_03" and NR band n2, n25 and n66

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1								
Information Element	Value/remark	Comment	Condition					
additionalSpectrumEmission	2 (NS_03)							

Table 7.3.2.4.3.2-2: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_03" and NR band n70

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1							
Information Element	Value/remark	Comment	Condition				
additionalSpectrumEmission	1 (NS_03)						

7.3.2.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.2.4.3.3-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_06" and NR band n12 and n14

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1									
Information Element	Value/remark	Comment	Condition						
additionalSpectrumEmission	1 (NS_06)								

7.3.2.4.3.4 Message contents exceptions (network signalled value "NS_35")

1. Information element additionalSpectrumEmission is set to NS_35. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.2.4.3.4-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_35" and NR band n71

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1								
Information Element	Value/remark	Comment	Condition					
additionalSpectrumEmission	1 (NS_35)							

7.3.2.4.3.5 Message contents exceptions (network signalled value "NS_27")

1. Information element additionalSpectrumEmission is set to NS_27. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.2.4.3.5-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_27" and NR band n48

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1								
Information Element	Value/remark	Comment	Condition					
additionalSpectrumEmission	1 (NS_27)							

7.3.2.4.3.6 Message contents exceptions (network signalled value "NS_21")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.2.4.3.6-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_21" and NR band n30

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1								
Information Element	Value/remark	Comment	Condition					
additionalSpectrumEmission	1 (NS_21)							
auditionalSpectrumemission	1 (113_21)							

7.3.2.4.3.7 Message contents exceptions (network signalled value "NS_45")

1. Information element additionalSpectrumEmission is set to NS_45. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.2.4.3.7-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_45" and NR band n53

Derivation Path: TS 38.508-1 [5], Table 4.6.3-1			
Information Element	Value/remark	Comment	Condition
additionalSpectrumEmission	1 (NS_45)		

7.3.2.4.3.8 Message contents exceptions (network signalled value "NS_56")

1. Information element additionalSpectrumEmission is set to NS_56. This can be set in *SIB1* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.2.4.3.8-1: AdditionalSpectrumEmission: Additional spurious emissions test requirement for "NS_56" and NR band n24

Derivation Path: TS 38.508-1 [5], Table 4.6.3-1			
Information Element	Value/remark	Comment	Condition
additionalSpectrumEmission	1 (NS_56)		

7.3.2.5 Test requirement

The throughput shall be $\ge 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A3.2 with reference receive power level specified in Tables 7.3.2.5-1a and Tables 7.3.2.5-1b for 2 Rx antenna port, Tables 7.3.2.5-2 a and Tables 7.3.2.5-2b for 4 Rx antenna port, Table 7.3.2.5-2c and Table 7.3.2.5-2d for PC2 UE on FDD bands, and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3.

Table 7.3.2.5-1a: Two antenna port Reference sensitivity QPSK PREFSENS for FDD bands

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	SCS	5	10	15	20	25	30 MHz		40	45	50	
Operating Band	kHz	MHz (dBm)	MHz (dBm)	MHz (dBm)	MHz (dBm)	MHz (dBm)	(dBm)	35 MHz (dBm)	MHz (dBm)	45 MHz (dBm)	MHz (dBm)	Duplex Mode
	15	-100.0 +TT	-96.8 +TT	-95.0 +TT	-93.8 +TT	-92.7 +TT	-91.9 +TT		-90.6 +TT	-90.1 +TT	-89.6 +TT	
n1	30		-97.1 +TT	-95.1 +TT	-94.0 +TT	-92.8 +TT	-92.0 +TT		-90.7 +TT	-90.2 +TT	-89.7 +TT	FDD
	60		-97.5 +TT	-95.4 +TT	-94.2 +TT	-93.0 +TT	-92.1 +TT		-90.9 +TT	-90.3 +TT	-89.7 +TT	
	15	-98.0 +TT	-94.8 +TT	-93.0 +TT	-91.8 +TT	-90.7 +TT	-84.1 +TT		-81.5 +TT			
n2	30		-95.1 +TT	-93.1 +TT	-92.0 +TT	-90.8 +TT	-84.2 +TT		-81.6 +TT			FDD
	60		-95.5 +TT	-93.4 +TT	-92.2 +TT	-90.9 +TT	-84.3 +TT		-81.7 +TT			
n3	15	-97.0 +TT	-93.8 +TT	-92.0 +TT	-90.8 +TT	-89.7 +TT	-88.9 +TT	-86.2+TT	-87.6 +TT	-81.3+TT	-79.7 +TT	FDD
	30		-94.1 +TT	-92.1 +TT	-91.0 +TT	-89.8 +TT	-89.0 +TT	-86.3+TT	-87.7 +TT	-81.4+TT	-79.8 +TT	
	60		-94.5 +TT	-92.4 +TT	-91.2 +TT	-90.0 +TT	-89.1 +TT	-86.4+TT	-87.9 +TT	-81.5+TT	-79.9 +TT	
	15	-98.0 +TT	-94.8 +TT	-93.0 +TT	-86.8 +TT	-84.8 +TT						FDD
n5	30		-95.1 +TT	-93.1 +TT	-88.6 +TT	-84.9 +TT						
	60											
	15	-98.0 +TT	-94.8 +TT	-93.0 +TT	-91.8 +TT							
n7¹	30		-95.1 +TT	-93.1 +TT	-92.0 +TT							FDD
	60		-95.5 +TT	-93.4 +TT	-92.2 +TT							1
	15	-97.0 +TT	-93.8 +TT	-91.4 +TT	-85.8 +TT			-78.4+TT				
n8	30		-94.1 +TT	-91.7 +TT	-87.2 +TT			-78.5+TT				FDD
	60											
	15	-97.0 +TT	-93.8 +TT	-84.0 +TT								
n12	30		-94.1 +TT	-84.1 +TT								FDD
	60											
n14	15	-97.0 +TT	-93.8 +TT									EDD
n14	30		-94.1 +TT									FDD

	60								
	15	-97.0 +TT	-93.8 +TT	-91.0 +TT	-89.8 +TT				
n20	30		-94.1 +TT	-91.1 +TT	-90.0 +TT				FDD
	60								
	15	-100.0 +TT	-96.8 +TT						
n24	30		-97.1 +TT						FDD
	60		-97.5 +TT						
	15	-96.5 +TT	-93.3 +TT	-91.5 +TT	-90.3 +TT	-89.3 +TT	-82.2 +TT	-79.5 +TT	
n25	30		-93.6 +TT	-91.6 +TT	-90.5 +TT	-89.4 +TT	-82.3 +TT	-79.6 +TT	FDD
	60		-94.0 +TT	-91.9 +TT	-90.7 +TT	-89.6 +TT	-82.4 +TT	-79.7 +TT	
-26	15	-97.5 +TT	-94.5 +TT	-92.7 +TT	-87.6 +TT				
n26	30		-94.8 +TT	-92.7 +TT	-87.7 +TT				
	15	-98.5 +TT	-95.5 +TT	-93.5 +TT	-90.8 +TT		-78.5 +TT		
n28	30		-95.6 +TT	-93.6 +TT	-91.0 +TT		-78.6 +TT		FDD
	60								
	15	-99.0 +TT	-95.8 +TT						
n30	30		-96.1 +TT						FDD
	60								
	15	-99.5+TT	-96.3+TT	-94.5+TT	-93.3+TT				
n65	30		-96.6+TT	-94.6+TT	-93.5+TT				FDD
	60		-97.0+TT	-94.9+TT	-93.7+TT				
	15	-99.5 +TT	-96.3 +TT	-94.5 +TT	-93.3 +TT	-92.2 +TT	-91.4 +TT	-90.1 +TT	
n66	30		-96.6 +TT	-94.6 +TT	-93.5 +TT	-92.3 +TT	-91.5 +TT	-90.2 +TT	FDD
	60		-97.0 +TT	-94.9 +TT	-93.7 +TT	-92.5 +TT	-91.6 +TT	-90.4 +TT	
	15	-100.0 +TT	-96.8 +TT	-95.0 +TT	-93.8 +TT	-92.7 +TT			
n70	30		-97.1 +TT	-95.1 +TT	-94.0 +TT	-92.8 +TT			FDD
	60		-97.5 +TT	-95.4 +TT	-94.2 +TT	-93.0 +TT			
n71	15	-97.2 +TT	-94.0 +TT	-91.6 +TT	-86.0 +TT				FDD

	30		-94.3 +TT	-91.9 +TT	-87.4 +TT					
	60	-								
	15	-99.5 ³ +TT	-96.3 ³ +TT	-94.5 ³ +TT	-93.3 ³ +TT					
n74	30		-96.6 ³ +TT	-94.6 ³ +TT	-93.5 ³ +TT					FDD
	60		-97.0 ³ +TT	-94.9 ³ +TT	-93.7 ³ +TT					
NOTE 1: Four NOTE 2: The t NOTE 3: ³ indi NOTE 4: Void NOTE 5: Void NOTE 6: TT fc	transmitter cates that	shall be set to the requiremen	PUMAX as defir t is modified b	ied in subclaus y -0.5 dB whe	se 6.2.4 n the assigned	NR chann		within 1475.9	-1510.9 MHz.	

Table 7.3.2.5-1b: Two antenna port reference sensitivity QPSK PREFSENS for TDD, SDL and FDD with variable duplex operation bands

Operating band	SCS kHz	Channel bandwidth (MHz)	REFSENS (dBm) ⁸	Duplex Mode		
	15	5, 10, 15	-100 + 10log10(Nкв/25)+TT			
n34	30	10, 15	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD		
	60	10, 15	-97.5 + 10log10(Nкв/11)+TT			
	15	5, 10, 15, 20, 25, 30, 40	-100 + 10log ₁₀ (N _{RB} /25)+TT	_		
n381	30	10, 15, 20, 25, 30, 40	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD		
	60	10, 15, 20, 25, 30, 40	-97.5 + 10log ₁₀ (N _{RB} /11)+TT			
	15	5, 10, 15, 20, 25, 30, 40	-100 + 10log ₁₀ (N _{RB} /25)+TT			
n39	30	10, 15, 20, 25, 30, 40	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD		
	60	10, 15, 20, 25, 30, 40	-97.5 + 10log10(Nкв/11)+TT			
	15	5, 10, 15, 20, 25, 30, 40, 50	-100 + 10log₁₀(N _{RB} /25)+TT			
n40	30	10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD		
	60	10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	-97.5 + 10log₁₀(N _{RB} /11)+TT			
	15	10, 15, 20, 30, 40, 50	-94.8 + 10log ₁₀ (N _{RB} /50)+TT			
n41 ¹	30	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100	-95.1 + 10log₁₀(N _{RB} /24)+TT	TDD		
	60	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100	-95.5 + 10log₁₀(N _{RB} /11)+TT			
	15	5, 10, 15, 20, 30, 40, 50 ⁵	-99 + 10log ₁₀ (N _{RB} /25)+TT			
n481	30	10, 15, 20, 30, 40, 50 ⁵ , 60 ⁵ , 70 ⁵ , 80 ⁵ , 90 ⁵ , 100 ⁵	-96.1 + 10log ₁₀ (N _{RB} /24) +TT	TDD		
	60	10, 15, 20, 30, 40, 50 ⁵ , 60 ⁵ , 70 ⁵ , 80 ⁵ , 90 ⁵ , 100 ⁵	-96.5 + 10log₁₀(N _{RB} /11)+TT			
n50	15	5, 10, 15, 20, 30, 40, 50	-100 + 10log ₁₀ (N _{RB} /25)+TT	TDD		
1100	30	10, 15, 20, 30, 40, 50, 60, 80	-97.1 + 10log10(Nкв/24)+TT			

	-		07.5	1
	60	10, 15, 20, 30, 40, 50, 60, 80	-97.5 +	
			10log ₁₀ (N _{RB} /11)+TT	
n51	15	5	-100+TT	TDD
	15	5, 10	-100 +	
n53	10	3, 10	10log ₁₀ (N _{RB} /25)+TT	TDD
1100	30	10	-97.1+TT	100
	60	10	-97.5+TT	
	15	10, 15, 20, 40, 50	-95.3 +	
	10	10, 10, 20, 40, 00	10log ₁₀ (N _{RB} /50)+TT	
n77 ^{1,4}	30	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-95.6 +	TDD
1177	30	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	10log10(N _{RB} /24)+TT	TUU
	60	10 15 20 40 50 60 70 80 00 100	-96.0 +	
	60	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	10log ₁₀ (N _{RB} /11)+TT	
	15	10 15 20 10 50	-95.8 + 10log10(NRB/50)	
	15	10, 15, 20, 40, 50	+TT	
	00	40, 45, 00, 40, 50, 00, 70, 00, 00, 400	-96.1 + 10log ₁₀ (N _{RB} /24)	TOD
n78¹	30	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	+TT	TDD
	<u> </u>	10 15 20 10 50 00 70 00 00 100	-96.5 +	
	60	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	10log ₁₀ (N _{RB} /11)+TT	
	45	40.50	-89.6 +	
	15	40, 50	10log ₁₀ (N _{RB} /216)+TT	
701		40 50 00 00 400	-89.7 + 10log ₁₀ (N _{RB} /106)	
n79 ¹	30	40, 50, 60, 80, 100	+TT	TDD
	00	10 50 00 00 100	-89.9 + 10log ₁₀ (N _{RB} /51)	
	60	40, 50, 60, 80, 100	+TT	
NOTE 1:	Four Rx	antenna ports shall be the baseline for this o	perating band except for two Rx	vehicular
	UE.		g	
NOTE 2:	The tran	smitter shall be set to PUMAX as defined in cla	use 6.2.4.	
NOTE 3:	Void			
NOTE 4:	The real	uirement is modified by -0.5 dB when the assi	igned UE channel bandwidth is c	onfined
_		300 - 3800 MHz.	5	
NOTE 5:		e bandwidths, the minimum requirements are	restricted to operation when car	rier is
		ed as a downlink carrier part of CA configurat		
NOTE 6:				
		bands, the reference sensitivity requirements	s shall be verified by inter-band C	CA
		tions with SDL band, which are supported by		
NOTE 8:		SENS value is rounded to the nearest numb		_{вв} " in
		IS formula is the maximum transmission ban		
	5.3.2-1.			
NOTE 9:		ach frequency and channel bandwidth is spec	cified in Table 7.3.2.5-3.	

Table 7.3.2.5-2a: Four antenna port Reference sensitivity QPSK PREFSENS FDD bands

Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	35 MHz (dBm)	40 MHz (dBm)	45 MHz (dBm)	50 MHz (dBm)	Duplex Mode
	15	-102.7 +TT	-99.5 +TT	-97.7 +TT	-96.5 +TT	-95.4 +TT	-94.6 +TT		-93.3 +TT	-92.8 +TT	-92.3 +TT	
n1	30		-99.8 +TT	-97.8 +TT	-96.7 +TT	-95.5 +TT	-94.7 +TT		-93.4 +TT	-92.9 +TT	-92.4 +TT	FDD
	60		-100.2 +TT	-98.1 +TT	-96.9 +TT	-95.7 +TT	-94.8 +TT		-93.6 +TT	-93 +TT	-92.4 +TT	
	15	-100.7 +TT	-97.5 +TT	-95.7 +TT	-94.5 +TT	-93.4 +TT	-86.8 +TT		-84.2 +TT			
n2	30		-97.8 +TT	-95.8 +TT	-94.7 +TT	-93.5 +TT	-86.9 +TT		-83.3 +TT			FDD
	60		-98.2 +TT	-96.1 +TT	-94.9 +TT	-93.6 +TT	-87.0 +TT		-84.4 +TT			
	15	-99.7 +TT	-96.5 +TT	-94.7 +TT	-93.5 +TT	-92.4 +TT	-91.6 +TT	- 88.9+ TT	-90.3 +TT	- 84.0+ TT	-82.4 +TT	
n3	30		-96.8 +TT	-94.8 +TT	-93.7 +TT	-92.5 +TT	-91.7 +TT	- 90.0+ TT	-90.4 +TT	- 84.1+ TT	-82.5 +TT	FDD
	60		-97.2 +TT	-95.1 +TT	-93.9 +TT	-92.7 +TT	-91.8 +TT	- 90.1+ TT	-90.6 +TT	- 84.2+ TT	-82.6 +TT	
	15	-100.7 +TT	-97.5 +TT	-95.7 +TT	-94.5 +TT							
n7	30		-97.8 +TT	-95.8 +TT	-94.7 +TT							FDD
	60		-98.2 +TT	-97.1 +TT	-94.9 +TT							
	15	-99.7 +TT	-96.5 +TT	-94.1 +TT	-88.5 +TT							
n8	30		-96.8 +TT	-94.4 +TT	-89.9 +TT							FDD
	60											
	15	-101.7 +TT	-98.5 +TT									
n30	30		-98.8 +TT									FDD
	60											
n66	15	-102.2 +TT	-99.0 +TT	-97.2 +TT	-96.0 +TT	-94.9 +TT	-94.1 +TT		-92.8 +TT			FDD

	30		-99.3 +TT	-97.3 +TT	-96.2 +TT	-95.0 +TT	-94.2 +TT		-92.9 +TT			
	60		-99.7 +TT	-97.6 +TT	-96.4 +TT	-95.2 +TT	-94.3 +TT		-93.1 +TT			
		-102.7	-99.5	-97.7	-96.5	-95.4	+11					
	15	+TT	-55.5 +TT	+TT	+TT	+TT						
p70	30		-99.8	-97.8	-96.7	-95.5						FDD
n70	30		+TT	+TT	+TT	+TT						FDD
	60		-100.2	-98.1	-96.9	-95.7						
	00	⁶⁰ +TT +TT +TT -TT										
NOTE 1:	Four Rx a	ar Rx antenna ports shall be the baseline for above listed operating band except for two Rx vehicular UE.										
NOTE 2	The requir	e requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.										
NOTE 3:	For these	these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of										
	CA configu	uration.		•				•	C C			
NOTE 4:	TT for eac	h frequen	cy and cha	nnel ban	dwidth is	specified	in Table 7	7.3.2.5-3.				

Table 7.3.2.5-2b: Four antenna port Reference sensitivity QPSK PREFSENS for TDD, SDL and FDD with variable duplex operation bands

		Operating band / SCS / Channel bandwid	dth / REFSENS	-
Operating band	SCS kHz	Channel bandwidth (MHz)	REFSENS (dBm) ⁸	Duplex Mode
	15	5, 10, 15	-100 + 10log ₁₀ (N _{RB} /25)- 2.7 +TT	
n34	30	10, 15	-97.1 + 10log ₁₀ (N _{RB} /24)+- 2.7 TT	TDD
	60	10, 15	-97.5 + 10log ₁₀ (N _{RB} /11)- 2.7 +TT	
	15	5, 10, 15, 20, 25, 30, 40	-100 + 10log ₁₀ (N _{RB} /25)- 2.7 +TT	
n381	30	10, 15, 20, 25, 30, 40	-97.1 + 10log ₁₀ (N _{RB} /24)- 2.7 +TT	TDD
	60	10, 15, 20, 25, 30, 40	-97.5 + 10log10(Nкв/11)- 2.7 +TT	
	15	5, 10, 15, 20, 25, 30, 40	-100 + 10log ₁₀ (N _{RB} /25)- 2.7 +TT	
n39	30	10, 15, 20, 25, 30, 40	-97.1 + 10log ₁₀ (N _{RB} /24)- 2.7 +TT	TDD
	60	10, 15, 20, 25, 30, 40	-97.5 + 10log ₁₀ (N _{RB} /11)- 2.7 +TT	
	15	5, 10, 15, 20, 25, 30, 40, 50	-100 + 10log ₁₀ (N _{RB} /25) - 2.7 +TT	
n40	30	10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	-97.1 + 10log ₁₀ (N _{RB} /24)- 2.7 +TT	TDD
	60	10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	-97.5 + 10log ₁₀ (N _{RB} /11)- 2.7 +TT	
	15	10, 15, 20, 30, 40, 50	-94.8 + 10log ₁₀ (N _{RB} /50)- 2.7 +TT	
n41 ¹	30	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100	-95.1 + 10log ₁₀ (N _{RB} /24)- 2.7 +TT	TDD
	60	10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100	-95.5 + 10log ₁₀ (N _{RB} /11)- 2.7 +TT	
	15	5, 10, 15, 20, 30, 40, 50 ⁵	-99 + 10log ₁₀ (N _{RB} /25)-2.2 +TT	
n481	30	10, 15, 20, 40, 50 ⁵ , 60 ⁵ , 70 ⁵ , 80 ⁵ , 90 ⁵ , 100 ⁵	-96.1 + 10log ₁₀ (N _{RB} /24)- 2.2 +TT	TDD
	60	10, 15, 20, 40, 50 ⁵ , 60 ⁵ , 70 ⁵ , 80 ⁵ , 90 ⁵ , 100 ⁵	-96.5 + 10log ₁₀ (N _{RB} /11)- 2.2+TT	
n77 ^{1,4}	15	10, 15, 20, 40, 50	-95.3 + 10log ₁₀ (N _{RB} /50)- 2.2 +TT	TDD

	30	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-95.6 + 10log10(Nкв/24)- 2.2 +TT							
	60	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-96.0 + 10log ₁₀ (N _{RB} /11)- 2.2 +TT							
	15	10, 15, 20, 40, 50	-95.8 + 10log10(NRB/50)- 2.2 +TT							
n78¹	30	10, 15, 20, 40, 50, 60, 70, 80, 90, 100	-96.1 + 10log ₁₀ (N _{RB} /24)- 2.2 +TT	TDD						
	60 10, 15, 20, 40, 50, 60, 70, 80, 90, 100 -96.5 + 10log ₁₀ (N _{RB} /11)- 2.2 +TT									
	15	40, 50	-89.6 + 10log ₁₀ (N _{RB} /216)- 2.2 +TT							
n79¹	30	30 40, 50, 60, 80, 100 -89.7 + 10log10(NRB/106)- 2.2 +TT TDD								
	60	40, 50, 60, 80, 100	-89.9 + 10log ₁₀ (N _{RB} /51)- 2.2 +TT							
NOTE 1:	Four Rx	antenna ports shall be the baseline for this	s operating band except for two Rx	vehicular						
NOTE 2: NOTE 3:	The tran	smitter shall be set to P_{UMAX} as defined in	clause 6.2.4.							
NOTE 4:		uirement is modified by -0.5 dB when the a 300 - 3800 MHz.	assigned UE channel bandwidth is c	onfined						
NOTE 5:		e bandwidths, the minimum requirements ed as a downlink carrier part of CA configu		rier is						
NOTE 6:										
NOTE 7:		bands, the reference sensitivity requirementions with SDL band, which are supported		A						
NOTE 8:	The REF	SENS value is rounded to the nearest number of the second	mber down to one decimal point. "N							
NOTE 9:	TT for ea	ach frequency and channel bandwidth is s	pecified in Table 7.3.2.5-3.							

Operating Band	WHZ	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	35 MHz	40 MHz	45 MHz	50 MHz
	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
	REFS	REFS	REFS	REFS	REFS	REFS	-	REFS	REFS	REFS
n1	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_		ENS_	ENS_	ENS_n
	n1	n1	n1	n1	n1	n1		n1	n1	1
	REFS	REFS	REFS	REFS	REFS	REFS	REFS	REFS	REFS	REFS
n3	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_n
115	n3	n3+	n3+	n3+	n3+	n3+	n3+	n3+	n3+	3+ 2.8
	+0.5	0.5	0.5	0.5	0.6	0.8	1.1	1.5	2.3	
NOTE 1:	The transm	nitter shall	be set to	PUMAX	as define	d in claus	e 6.2.4			
NOTE 2:	REFSENS	n1 refers	s to the tw	o antenn	a port and	d four ant	enna port	Reference	ce Sensiti	vity of
		Table 7.3.2.5-1a and Table 7.3.2.5-2a.								
NOTE 3:	REFSENS	ENS_n3 refers to the two antenna port and four antenna port Reference Sensitivity of								
		in Table 7.3.2.5-1a and Table 7.3.2.5-2a.								

Table 7.3.2.5-2c: Reference Sensitivity for PC2 UE on FDD bands for UE not supporting Tx Diversity

Table 7.3.2.5-2d: Reference Sensitivity for PC2 UE on FDD bands for UE supporting Tx Diversity operation bands

Operating Band	5 MHz (dB)	10 MHz (dB)	15 MHz (dB)	20 MHz (dB)	25 MHz (dB)	30 MHz (dB)	35 MHz (dB)	40 MHz (dB)	45 MHz (dB)	50 MHz (dB)
	REFS	REFS	REFS	REFS	REFS	REFS	-	REFS	REFS	REFS
n1	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_		ENS_	ENS_	ENS_n
	n1	n1	n1	n1	n1	n1		n1	n1	1
	REFS	REFS	REFS	REFS	REFS	REFS	REFS	REFS	REFS	REFS
n3	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_	ENS_n
115	n3+	n3+	n3+	n3+	n3+	n3+	n3+	n3+	n3+	3+
	1.4	1.5	1.5	1.5	1.6	1.7	2.8	[5]	[5.5]	[6.0]
NOTE 1: T	he transm	nitter shall	be set to	PUMAX as	defined	in clause	6.2G.4			
NOTE 2: R	EFSENS	SENS_n1 refers to the two antenna port and four antenna port Reference Sensitivity of								
n	1 in Table 7.3.2.5-1a and Table 7.3.2.5-2a.									
NOTE 3: R	EFSENS	SENS_n3 refers to the two antenna port and four antenna port Reference Sensitivity of								
n	3 in Table	7.3.2.5-1	a and Ta	ble 7.3.2.	5-2a.		-			-

f ≤ 3.0GHz	3.0GHz < f ≤ 6.0 GHz
0.7 dB	1.0 dB

Table 7.3.2.5-3: Test Tolerance (TT) for RX sensitivity level

For the UE which supports inter-band carrier aggregation, the minimum requirement for reference sensitivity in Table 7.3.2.5-1 a and Table 7.3.2.5-1b shall be increased by the amount given in $\Delta R_{IB,c}$ defined in subclause 7.3.3 for the applicable operating bands.

7.3.3 ΔRIB,c

For a UE supporting CA, SUL or DC band combination, the minimum requirement for reference sensitivity in Table 7.3.2.3-1 shall be increased by the amount given by $\Delta R_{IB,c}$ defined in subclause 7.3A.0.3, 7.3C.0.3, 7.3B in this specification and 7.3A, 7.3B in TS 38.101-3 [4] for the applicable operating bands.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is ≤ 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the average value for all band combinations defined in subclause 7.3A.0.3, 7.3C.0.3, 7.3B in this specification and 7.3A, 7.3B in TS 38.101-3 [4], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum $\Delta R_{IB,c}$ among the different supported band combinations involving such band shall be applied
- When the operating band frequency range is > 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the maximum value for all band combinations defined in subclause 7.3A.0.3, 7.3C.0.3, 7.3B in this specification and 7.3A, 7.3B in TS 38.101-3 [4] for the applicable operating bands.

7.3A Reference sensitivity for CA

Editor's Note: This clause is incomplete. The following aspects are either missing or not yet determined:

Test requirement table for 2DL/2UL is not complete.

- Reference sensitivity power level for 4DL_CA and 5DL_CA are FFS.
- Test description for exceptional cases are incomplete.

7.3A.0 Minimum conformance requirements

7.3A.0.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

7.3A.0.2 Reference sensitivity power level for CA

7.3A.0.2.1 Reference sensitivity power level for Intra-band contiguous CA

For intra-band contiguous carrier aggregation, the throughput of each component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2.3-1, Table 7.3.2.3-2, and Table 7.3.2.3-3.

For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.2.3-3 and the downlink PCC carrier centre frequency shall be configured closer to uplink operating band than any of the downlink SCC centre frequency.

7.3A.0.2.2 Reference sensitivity power level for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, throughput of each downlink component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) and parameters specified in Table 7.3.2.3-1, Table 7.3.2.3-2, and Table 7.3.A.0.2.2-1 with the reference sensitivity power level increased by Δ RIBNC given in Table 7.3.A.0.2.2-1 for the SCC(s). For aggregation of two or more downlink FDD carriers with one uplink carrier the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3.A.0.2.2-1. The requirements apply with all downlink carriers active. Unless given by Table 7.3.2.3-4, the reference sensitivity requirements shall be verified with the network signalling value NS 01 (Table 6.2.3.3.1-1) configured.

CA configuration	SCS (PCC/SCC) (kHz)	Aggregated channel bandwidth (PCC+SCC)	W _{gap} / [MHz]	UL PCC allocation	ΔR _{IBNC} (dB)	Duplex mode					
CA_n66(2A)	N/A	NOTE 1	NOTE 2	NOTE 3, NOTE 4	0.0	FDD					
CA_n71(2A)	15/15	5MHz + 5MHz	W _{gap} = 25.0	5	4.0						
			$W_{gap} = 5.0$	20	0.0						
			$W_{gap} = 20.0$	5 (RBstart =	4.6						
		10MHz + 5MHz		9)							
			$W_{gap} = 5.0$	20 (RBstart	2.3	FDD					
				= 9)		FDD					
			$W_{gap} = 10.0$	5 (RBstart =	22.2						
		15MHz + 10MHz		2)							
		1310112 + 1010112	$W_{gap} = 5.0$	20 (RBstart	5.2						
				= 19)							
CA_n77(2A)		NOTE 1	NOTE 2	NOTE 3	0.0	TDD					
CA_n78(2A)		NOTE 1	NOTE 2	NOTE 3	0.0	TDD					
NOTE 1: All co	ombinations of	channel bandwidths defined i	n Table 5.5A.2-1.								
NOTE 2: All applicable sub-block gap sizes.											
NOTE 3: The PCC allocation is same as Transmission bandwidth configuration NRB as defined in Table 5.3.2-1.											
NOTE 4: The carrier centre frequency of PCC in the DL operating band is configured closer to the UL operating											
band.											
NOTE 5: Wgap	is the sub-bloc	k gap between the two sub-b	locks.								

Table 7.3A.0.2.2-1: Intra-band non-contiguous CA with one uplink configuration for reference sensitivity

7.3A.0.2.3 Reference sensitivity power level for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band the throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 with parameters specified in Table 7.3.2.3-1, Table 7.3.2.3-2 and Table 7.3.2.3-3 modified in accordance with subclause 7.3A.0.3.2. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active. Exceptions to reference sensitivity are allowed in accordance with subclause 7.3A.0.4.

7.3A.0.2.4 Reference sensitivity power level for SDL bands

For band combinations including operating bands without uplink band (as noted in Table 5.2-1), the requirements are specified in Table 7.3A.0.2.4-1 and for any band with uplink the uplink configuration specified in Table 7.3.2.3-3. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels, as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one-sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal, as described in Annex A.5.1.1/A.5.2.1). The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active. Exceptions to reference sensitivity are allowed in accordance with clause 7.3A.0.4.

					NR	Band/Ch	annel ba	ndwidth						
NR CA	NR	SCS	5	10	15	20	25	30	40	50	60	80	90	100
Configura	band	(kHz)	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
tion		. ,	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
CA_n8A-	n8	15	-97.0	-93.8	-92.0	-90.0								
n75A		30		-94.1	-92.1	-90.2								
		60												
	n75	15	-100	-96.8	-95.0	-93.8								
		30		-97.1	-95.1	-94.0								
		60		-97.5	-95.4	-94.2								
CA_n28A-	n28	15	-98.5	-95.5	-93.5	-90.8								
n75A		30		-95.6	-93.6	-91.0								
		60												
	n75	15	-100	-96.8	-95.0	-93.8								
		30		-97.1	-95.1	-94.0								
		60		-97.5	-95.4	-94.2								
CA_n29A-	n29	15	-97.0	-93.8										
n66A		30		-94.1										
CA_n29A-		60												
n66B	n66	15	-99.5	-96.3	-94.5	-93.3			-90.1					
CA_n29A-		30		-96.6	-94.6	-93.5			-90.2					
n66(2A)		60		-97.0	-94.9	-93.7			-90.4					
CA_n29A -n70A	n29	15	-97.0	-93.8										
		30		-94.1										
		60												
	n70	15	-100	-96.8	-95.0	-93.8	-92.7							
		30		-97.1	-95.1	-94.0	-92.8							
		60		-97.5	-95.4	-94.2	-93.0							
CA_n29A -n71A	n29	15	-97.0 ³	-93.8 ³										
-11/1/4		30		-94.1 ³										
		60												

Table 7.3A.0.2.4-1: Reference sensitivity for SDL bands

	n71	15	-97.2	-94.0	-91.6	-86.0							
		30		-94.3	-91.9	-87.4	 						
		60											
CA_n75A-	n75	15	-100	-96.8	-95.0	-93.8							
n78A ¹		30		-97.1	-95.1	-94.0							
		60		-97.5	-95.4	-94.2							
	n78	15		-95.8	-94.0	-92.7		-89.6	-88.6				
		30		-96.1	-94.1	-92.9		-89.7	-88.7	-87.9	-86.6	-86.1	-85.6
		60		-96.5	-94.4	-93.1		-89.9	-88.8	-88.0	-86.7	-86.2	-85.7

					NR E	Band/Cha	annel ba	ndwidth						
NR CA	NR	SCS	5	10	15	20	25	30	40	50	60	80	90	100
Configura	band	(kHz)	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
tion														
CA_n76A- n76 15 -100														
n78A ¹	n78A ¹ 30													
		60												
	n78	15		-95.8	-94.0	-92.7			-89.6	-88.6				
		30		-96.1	-94.1	-92.9			-89.7	-88.7	-87.9	-86.6	-86.1	-85.6
	60 -96.5 -94.4 -93.1 -89.9 -88.8 -88.0 -86.7 -86.2 -85.7													
NOTE 1: The transmitter shall be set to P _{UMAX} , as defined in subclause 6.2.4.														
NOTE 2: Four Rx antenna ports shall be the baseline for this operating band, except for two Rx vehicular UE.														
NOTE 3: Fo	or CA_n2	29-n71 M	SD due to	o cross b	and isola	tion exce	ption spe	ecified in	Table 7.3	BA.0.6-1 i	s applied			

7.3A.0.3 $\Delta R_{IB,c}$ for CA

7.3A.0.3.1 General

For a UE supporting a CA configuration, the $\Delta R_{IB,c}$ applies for both SC and CA operation.

7.3A.0.3.2 $\Delta R_{IB,c}$ for Inter-band CA

For the UE which supports inter-band carrier aggregation, the minimum requirement for reference sensitivity in subclause 7.3A.0 shall be increased by the amount given by $\Delta R_{IB,c}$ defined in subclause 7.3A.0.3.2 for the applicable operating bands. Unless otherwise stated, $\Delta R_{IB,c}$ is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is ≤ 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the average value for all band combinations defined in subclause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.521-3 [14], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum $\Delta R_{IB,c}$ among the different supported band combinations involving such band shall be applied.
- When the operating band frequency range is > 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the maximum value for all band combinations defined in subclause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.521-3 [14] for the applicable operating bands.

7.3A.0.3.2.1 $\Delta R_{IB,c}$ for two bands

Inter-band CA configuration	NR Band	ΔR _{IB,c} (dB)
CA_n1-n77	n1	0.2
	n77	0.5
CA_n1-n78	n78	0.5
CA_n2-n48	n2	0.2
	n48	0.5
CA_n2-n66	n2	0.3
	n66	0.3
CA_n2-n77	n2	0.2
	n77	0.5
CA_n3-n41	n41	02
		0.53
CA_n3-n77	n3	0.2
_	n77	0.5
CA_n3-n78	n3	0.2
CA n2 n70	n78	0.5
CA_n3-n79	n79	0.5
CA_n5-n77	n5	0.2
	n77 n5	0.5 0.2
CA_n5-n78		0.2
	n78 n7	0.5
CA_n7-n78	n78	0.5
	n8	0.3
CA_n8-n78	n78	0.2
CA_n8-n79	n79	0.5
CA_n24-n48	n24	0.2
0//_1124 1140	n48	0.5
CA_n24-n77	n24	0.2
0, (_1,2,1,1,1,1)	n77	0.5
CA n28-n75	n28	0.2
	n28	0.2
CA_n28-n78	n78	0.5
04 = 00 = 70	n28	0.2
CA_n28-n79	n79	0.5
CA_n41-n78 ¹	n78	0.5
CA_n41-n79	n41	0.5
CA_1141-1179	n79	0.5
CA_n48-n66	n48	0.5
CA_1140-1100	n66	0.2
CA_n48-n70	n48	0.5
	n70	0.2
CA_n75-n78	n78	0.5
CA_n76-n78	n78	0.5
synchro	quirements only apply when the sub-f onized between the component carrie onization, the requirements are not w	ers. In the absence of
NOTE 2: The red - 2690	quirement is applied for UE transmitti MHz.	ng on the frequency range of 2515
NOTE 3: The red - 2515	quirement is applied for UE transmittin MHz.	ng on the frequency range of 2496

7.3A.0.3.2.2 Void

7.3A.0.3.2.3 $\Delta R_{IB,c}$ for three bands

Table 7.3A.0.3.2.3-1: $\Delta R_{IB,c}$ due to CA (three bands)

Inter-band CA combination	NR Band	ΔR _{IB,c} (dB)
CA_n1-n78-n79	n78	0.5
CA_n26-n66-	n26	0
n70	n66	0
170	n70	0
	n26	0
CA_n26-n70-	n70	0
171	n71	0
CA p.18 p.66	n48	0.5
CA_n48-n66- n70	n66	0.2
170	n70	0.2
CA p.18 p.66	n48	0.2
CA_n48-n66-	n70	0.2
117.1	n71	0.2
CA = 10 = 70	n48	0.2
CA_n48-n70-	n70	0.2
11/1	n71	0.2
04 =00 =70	n66	0
CA_n66-n70-	n70	0
n71	n71	0

7.3A.0.3.2.4 $\Delta R_{IB,c}$ for four bands

Table 7.3A.0.3.2.4-1: $\Delta R_{IB,c}$ due to CA (four bands)

Inter-band CA	NR Band	$\Delta R_{IB,c} (dB)$
combination		

7.3A.0.4 Reference sensitivity exceptions due to UL harmonic interference for CA

Editor's Note: Table 7.3A.0.4-1 format is different from 38.101-1 (V17.6.0) Table 7.3A.4-1. The old format will exist until RAN5 has final solutions on how to adopt RAN4 corresponding table for the minimum requirement of Reference sensitivity exceptions due to UL harmonic, and the resulted possible new format of Table 7.3A.1_1.4.1-1: Test Configuration Table for inter-band 2DL CA exceptions, and Table 7.3A.1_1.5-1: Reference sensitivity requirement for inter band CA.

Sensitivity degradation is allowed for a band in frequency range 1 if it is impacted by UL harmonic interference from another band in frequency range 1 of the same CA configuration. Reference sensitivity exceptions are specified in Table 7.3A.0.4-1 with uplink configuration specified in Table 7.3A.0.4-2.

	MSD due to harmonic exception for the DL band											
UL band	DL band											
		dB <										

n1	n77 ^{1,2}		23.9	22.1	20.9			17.9	16.8	16.0		14.8	14.3	13.8
111	n77 ³		1.1	0.8	0.3									
n3	n77 ^{1,2}		23.9	22.1	20.9			17.9	16.9	16.1		14.8	14.3	13.8
	n77 ³ n78 ^{1,2}		1.1	0.8	0.3			17.0	16.0	10.1		110	14.2	12.0
n3	n78', <u>*</u> n78 ³		23.9 1.1	22.1	20.9 0.3			17.9	16.9	16.1		14.8	14.3	13.8
n5	n77 ^{4,5,13}		10.5	0.8 8.9	7.8	7.2	6.5	5.1	4.2	3.5	2.8	2.3	2.1	1.4
n5 n5	n77 ^{6,7,13}		10.3	8.9	7.8	6.7	6.0	4.7	3.7	3.5	2.3	1.7	1.2	0.7
n5	n78 ^{4,5}		10.4	8.9	7.8	7.1	6.5	5.4	4.2	3.5	2.0	2.3	2.1	1.4
n8	n78 ^{4,5}		10.8	9.1	8.0		0.0	5.1	4.2	3.5		2.3	2.1	1.4
n8	n79 ^{6,7}							[6.8]	6.2	[5.6]		4.9		4.4
n24	n77 ^{1,2,13}		23.9	22.1	20.9	19.8	19.0	17.9	16.8	16.0		14.8	14.3	13.8
	n77 ^{3,13}		1.1	0.8	0.3	0.1								
n28	n75 ^{1,2}	28.1	25.3	24.0	22.8									
		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												
n66	n48 ^{1,2}	27.1	23.9	22.1	20.9			17.9	16.9 ¹²	16.1 ¹²			14.8 ¹²	14.3 ¹²
	n48 ³	1.9	1.1	0.8	0.3	4.4								
n71 NOTE 1	n70 ^{8,9}	9.9	7.1	6.7	4.9	4.1	ono in	اميناميما	DE within	the uplin	k tronom	l Nacion k	l bandwidth	of the
	victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the band combination: $\Delta F_{HD} = 10$ MHz for CA_n1-n77, CA_n3-n77, CA_n3-n78. NOTE 2: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \left\lfloor f_{DL}^{HB} / 0.2 \right\rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band. NOTE 3: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at $\pm \left(20 + BW_{Channel}^{HB} / 2\right)$ MHz offset from $2f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB} - BW_{Channel}^{LB} / 2$, where $BW_{Channel}^{LB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively. NOTE 4: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a													
NOTE 5	5: The req	uiremer	nts should	d be veri	ified for	UL NR-	ARFCN	of a low	band (su	iperscript	LB) suc	h that	high band the carri	
									width con					
NOTE 6	6: These r	equirem	nents app	ly when	there is	at least	one inc	dividual	RE within	the uplin	k transm	nission b	andwidth high ban	
NOTE 7	7: The req $f_{UL}^{LB} = \lfloor$	uiremer $f_{DL}^{HB} / 0.5$	nts should $5_{0.1}^{0.1}$ in M	d be veri IHz and	fied for $F_{UL_low}^{LB}$	UL NR- BW^{LB}_{Char}	ARFCN $_{nnel} / 2 \leq$	of a low $f_{UL}^{LB} \leq F_{UL}$	band (su $\frac{LB}{UL_high} - B$	$W_{Channel}^{LB}$ / 2	LB) such $\frac{f}{f}$ with f	h that	carrier fre	
	of a high band in MHz and ^{BW^{LB}_{Channel} the channel bandwidth configured in the low band. NOTE 8: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.}													
NOTE 9: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{\ LB} = \left\lfloor f_{DL}^{\ HB} / 0.3 \right\rfloor 0.1$ in MHz and $F_{UL_low}^{\ LB} + BW_{Channel}^{\ LB} / 2 \le f_{UL_high}^{\ LB} - BW_{Channel}^{\ LB} / 2$ with $f_{DL}^{\ HB}$ carrier frequency in														
									width cont					
NOTE 10: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band n25 is located with its upper edge at 1995 MHz.														
	 NOTE 11: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity for all active downlink component carriers is only verified when this is not the case (the requirements specified in clause 7.3.2 apply unless otherwise specified). NOTE 12: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink component of CA configured and the configured as a downlink component. 													
NOTE 1	 downlink carrier part of CA configuration. OTE 13: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. 													

UL	DL	UL BW	SCS of UL band	UL RB Allocation	DL BW	MSD	UL/DL fc	UL/DL harmonic						
band	band	(MHz)	(kHz)	Lcrb	(MHz)	(dB)	condition	order						
n2	n48	5	15											
n2	n48	10 15 50 (RBstart=0) 100 ⁷ 13.8 NOTE 2 UL2/DL1 direct-hit												
n2	n48													
n2	n77 5 15 25 (RBstart=0) 10 23.9 NOTE 2 UL2/DL1 direct-hit direct-hit													
n2	n77	10	15	50 (RBstart=0)	100	13.8	NOTE 2	UL2/DL1 direct-hit						
n2 NOTE 1:	n77	5	15	25 (RBstart=0) there is at least one	10	1.1	NOTE 6	UL2/DL1 near-miss						
NOTE 2: NOTE 3: NOTE 4:	transmis The required that f_{UL}^{LB} frequence that f_{UL}^{LB} frequence frequence frequence The required	ssion band irrements $f = \int f_{DL}^{HB} / C$ cy in the v uirrements $= \int f_{DL}^{HB} / C$ cy in the v uirrements	dwidth of a victi should be verifi $0.2 \downarrow 0.1$ in MHz a ictim (higher) b should be verif $0.3 \downarrow 0.1$ in MHz a ictim (higher) b should be verifi	and $F_{UL_{low}}^{LB} + BW_{Chat}^{LB}$ and in MHz and the fied for UL EARFCN	CN of the a $_{nel} / 2 \le f_U^T$ the channel CN of the $_{nnel} / 2 \le f_U$ the channel L of the age	aggresse $E_{L}^{B} \leq F_{UL_{-}}^{LB}$ bandwid aggress $E_{UL}^{LB} \leq F_{UL}^{LB}$ bandwid ggressor	br (lower) band (su $high - BW_{Channel}^{LB} / 2 \sqrt{2}$ dth configured in the cor (lower) band (su $\frac{B}{2} - high - BW_{Channel}^{LB} / 2$ th configured in the (lower) band (sup	uperscript LB) such with carrier he lower band. uperscript LB) such with the carrier e low band. erscript LB) such						
NOTE 5: NOTE 6:	that $f_{UL}^{LB} = \left[f_{DL}^{HB} / 0.5 \right] 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band. E 6: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at $\pm (20 + BW_{Channel}^{HB} / 2)$ MHz offset from $2f_{UL}^{LB}$ in the victim (higher band) with													
	$F_{UL_tow}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.													

Table 7.3A.0.4-1a: Reference sensitivity exceptions and uplink/downlink configurations due to UL harmonic from a PC3 aggressor NR UL band for NR DL CA FR1

					NR Ban	d / Char	nel ban	dwidth o	of the hig	gh band				
UL band	DL band	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	70 MHz	80 MHz	90 MHz	100 MHz
n1	n77		25	36	50			100	100	100		100	100	100
n3	n77		25	36	50			50	50	50		50	50	50
n3	n78		25	36	50			50	50	50		50	50	50
n5	n77		16	25	25	25	25	25	25	25	25	25	25	25
n5	n78		16	25	25	25	25	25	25	25		25	25	25
n8	n78		16	25	25			25	25	25		25	25	25
n8	n79							25	25	25		25		25
n24	n77	12	25	25	25	25	25	25	25	25		25	25	25
n28	n75	12	25	36	50									
n28	n78		10	15	20			25	25	25		25	25	25
n66	n48	12	25	36	50			100	128	160			200	200
n71	n70	8	16	20	20	20								
	NOTE 1: NOTE 2: NOTE 3:	The U blocks accord Unless	L config exceed ding to T s stated	uration a that spe able 7.3. otherwis	cified in 2.3-3 ap e, UL res	gardless Table 7.3 plies.	3.2.3-3 fo locks sha	or the up	link band		which ca	ase the a	ne UL res llocation width	

Table 7.3A.0.4-2: Uplink configuration for reference sensitivity exceptions due to UL harmonic interference for NR CA, FR1

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Table 7.3A.0.4-3: Void

Table 7.3A.0.4-3a: Void

Sensitivity degradation is allowed for a band if it is impacted by receiver harmonic mixing due to another band part of the same CA configuration. Reference sensitivity exceptions are specified in Table 7.3A.0.4-4 with uplink configuration specified in Table 7.3A.0.4-4a.

Table 7.3A.0.4-4: Reference sensitivity exceptions due to harmonic mixing from a PC3 aggressor NR UL band for DL NR CA FR1

UL band	DL band	5 MHz (dB)	10 MHz (dB)	15 MHz (dB)	20 MHz (dB)	25 MHz (dB)	40 MHz (dB)	50 MHz (dB)	60 MHz (dB)	80 MHz (dB)	90 MHz (dB)	100 MHz (dB)
n41	n78¹		8.3	8.0	6.9		3.9	3	2.3	1.2		0.4
n77	n2	6.7	5.0	4.0	3.7							
n77	n5	5.7	4.0	3.0	2.7							
n78	n41 ²		10.4	10.4	10.4		7.2	6.2	5.5	4.5		4.5
	frequence band. The request that f_{UL}^{LE}	$f = \left\lfloor f_{DL}^{HB} \right\rangle$ by in the purpose of the second s	(0.15]0.1 victim (high s should b f_{DL}^{HB} 0.1 ir	in MHz a gher) ban pe verified MHz and	nd $F_{UL_low}^{LB}$ d in MHz d for UL E d $F_{UL_low}^{HB}$	$+ BW_{Chan}^{LB}$ and BW_{C}^{C} EARFCN $+ BW_{Chann}^{HB}$	$f_{annel}/2 \le f_{d}^{HB}$ f_{annel}^{HB} the operator of the agg $f_{el}/2 \le f_{UL}^{H}$	$F_{UL}^{LB} \leq F_{UL}^{LB}$ channel b gressor (h $B^B \leq f_{UL-hig}^{HB}$	$h_{high} - BW_{C}$ wandwidth high) band $g_{h} - BW_{Ch}^{H}$	^{LB} / 2 ^{Channel} / 2	with f_{DL}^{HB} and the second se	carrier Iower such rrier

UL band	DL band	SCS (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
n41	n78	30		24	24	24		24	24	24	24	24	24
n77	n2	15	25	50	75	100							
n77	n5	15	25	20	20								
n78	n41	30		50	50	50		50	50	50	50	50	50
NOTE 1	OTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource												
	blocks exceed that specified in Table 7.3.2.3-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2.3-3 applies.												

Table 7.3A.0.4-4a: Uplink configuration for reference sensitivity exceptions due to receiver harmonic mixing for CA in NR FR1

7.3A.0.5 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

For inter-band carrier aggregation with uplink assigned to two NR bands given in Table 7.3A.0.5-1 and Table 7.3A.0.5-1a, the reference sensitivity is defined only for the specific uplink and downlink test points specified in Table 7.3A.0.5-1 and Table 7.3A.0.5-1a. For these test points the reference sensitivity requirement specified in Table 7.3.2.3-1 and Table 7.3.2.3-2 are relaxed by the amount of the corresponding parameter MSD given in Table 7.3A.0.5-1 and Table 7.3A.0.5-1a.

Table 7.3A.0.5-1: 2DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations for PC3 CA

NR CA ConfigurationCA_n1A-n3ACA_n1-n8CA_n1-n8CA_n1A-n78ACA_n2-n48CA_n2-n66	NR band n1 n3 n1 n8 n1 n78 n2 n48 n2 n66 n2 n66 n2 n66 n2 n2	UL Fc (MHz) 1950 1760 1965 887.5 1950 3710 1852.5 3625 1855 1775 1883.3 1750	UL/DL BW (MHz) 5 5 5 5 5 5 5 5 10 5 20 5 5 5 5	UL CLRB 25 25 25 25 25 25 25 50 25 100	DL Fc (MHz) 2140 1855 2155 932.5 2140 3710 1932.5	MSD (dB) 23 N/A 6.0 N/A 8.0 10.7 ⁵ N/A	Duplex modeFDDFDDFDDFDDFDDFDDTDD	IMD3 N/A IMD4 N/A IMD4
CA_n1-n8 CA_n1A-n78A CA_n2-n48	n3 n1 n8 n1 n78 n2 n48 n2 n66 n2 n66 n2 n66 n2	1760 1965 887.5 1950 3710 1852.5 3625 1855 1775 1883.3	5 5 5 10 5 20 5	25 25 25 25 25 50 25	1855 2155 932.5 2140 3710	N/A 6.0 N/A 8.0 10.7 ⁵ N/A	FDD FDD FDD FDD	N/A IMD4 N/A IMD4
CA_n1-n8 CA_n1A-n78A CA_n2-n48	n1 n8 n1 n78 n2 n48 n2 n66 n2 n66 n2 n66 n2	1965 887.5 1950 3710 1852.5 3625 1855 1775 1883.3	5 5 10 5 20 5	25 25 25 50 25	2155 932.5 2140 3710	6.0 N/A 8.0 10.7 ⁵ N/A	FDD FDD FDD	IMD4 N/A IMD4
CA_n1A-n78A CA_n2-n48	n8 n1 n78 n2 n48 n2 n66 n2 n66 n2 n66 n2	887.5 1950 3710 1852.5 3625 1855 1775 1883.3	5 5 10 5 20 5	25 25 50 25	932.5 2140 3710	N/A 8.0 10.7 ⁵ N/A	FDD FDD	N/A IMD4
CA_n2-n48 -	n1 n78 n2 n48 n2 n66 n2 n66 n2 n66 n2	1950 3710 1852.5 3625 1855 1775 1883.3	5 10 5 20 5	25 50 25	2140 3710	8.0 10.7 ⁵ N/A	FDD	IMD4
CA_n2-n48 -	n78 n2 n48 n2 n66 n2 n66 n2 n2	3710 1852.5 3625 1855 1775 1883.3	10 5 20 5	50 25	3710	10.7 ⁵ N/A		
	n2 n48 n2 n66 n2 n66 n2	1852.5 3625 1855 1775 1883.3	5 20 5	25			TOD	
	n48 n2 n66 n2 n66 n2	3625 1855 1775 1883.3	20 5		1022 5		TDD	N/A
	n2 n66 n2 n66 n2	1855 1775 1883.3	5	100		12	FDD	IMD4
CA_n2-n66 -	n66 n2 n66 n2	1775 1883.3			3625	N/A	TDD	N/A
CA_n2-n66 -	n2 n66 n2	1883.3	5	25	1935	20	FDD	IMD3
	n66 n2			25	2175	N/A	FDD	N/A
	n2	1750	5	25	1963.3	N/A	FDD	N/A
-			5	25	2150	4	FDD	IMD5
-		1855	5	25	1935	26 28.7 ⁵	FDD	IMD2
F	n77	3790	10	50	3790	N/A	TDD	N/A
	n2	1900	5	25	1980	8.0 10.7 ⁵	FDD	IMD4
	n77	3720	10	50	3720	N/A	TDD	N/A
CA_n2-n77	n2	1885	5	25	1965	5	FDD	IMD5
	n77	3810	10	50	3810	N/A	TDD	N/A
	n2	N/A	5	N/A	1987.5	2.7	FDD	IMD7
-	112	3455	10	1	3455	N/A	TDD	N/A
	n77 ¹²	3945	10	RB _{START} =10	3945		100	10/7
	n3	1771	10	RB _{START} =0 50	1866	4	FDD	IMD4
CA_n3A-n5A	n5	838	5	25	883	4 N/A	FDD	N/A
	n3	1740	5				FDD	IMD4
CA_n3A-n41A		2657.5	5 10	25 50	1835 2657.5	8.2	TDD	
	n41		10		<u>2657.5</u> 1816	N/A N/A	FDD	N/A N/A
CA_n3A-n5A	<u>n3</u> n5	1721 838	5	50 25	883	24	FDD	IMD2
	n3	1740	5	25	1835	[26]	FDD FDD	IMD2
CA_n3A-n78A	n78	3575	10	25	3575	[28.7 ⁵] N/A	TDD	N/A
CA_n3A-n78A	n3	1765	5	25	1860	[8.0] [10.7 ⁵]	FDD	IMD4
	n78	3435	10	25	3435	N/A	TDD	N/A
	n5	838	5	25	883	30	FDD	IMD2
CA_n5-n66	n66	1721	5	25	2121	N/A	FDD	N/A
CA_n5A-n77A ⁶	n5	844	5	25	889	8.3	FDD	IMD4
	n77	3421	10	50	3421	N/A	TDD	N/A
	n5	829	5	25	874	5.5	FDD	IMD5
-	n77	4190	10	50	4190	N/A	TDD	N/A
	n8	897.5	5	25	942.5	8.3	FDD	IMD4
CA_n8A-n78A	n78	3635	10	50	3635	N/A	TDD	N/A
CA_n24-n77 ¹⁰	n24	N/A	N/A	N/A	N/A	N/A	FDD	IMD4
	n77	N/A	N/A	N/A	N/A	N/A	TDD	N/A
	n26	838	5	25	883	30	FDD	IMD2
CA_n26A-n66A	n66	1721	5	25	2121	N/A	FDD	N/A
	n26	838	5	25	883	30	FDD	IMD2
CA_n26A-n70A	n70	1710	5	25	2020	N/A	FDD	N/A
	n48	3660	5	25	3660	N/A	TDD	N/A
CA_n48A-n66A	n48 n66	1730	5	25	2130		FDD	IMD5
CA p484 p704	n70	1697.5	5 25/15	25 25	1997.5	5.0 26	FDD FDD	IMD5
CA_n48A-n70A	n 10			50	260F	28.7 ⁵		N1/A
	n48 n66	3695 1750	10 5	50 25	3695 2150	N/A 5	TDD FDD	N/A IMD4

CA_n66A-n71A CA_n66(2A)-n71A CA_n66B-n71A	n71	675	5	25	629	N/A	FDD	N/A
CA_n66A-n77A	n66	1775	5	25	2175	31	FDD	IMD2
	n77	3950	10	50	3950	N/A	TDD	N/A
	n66	1760	5	25	2160	5.0	FDD	IMD5
	n77	3720	10	50	3720	N/A	TDD	N/A
CA n70A-n71A	n70	1697.5	5	25	1997.5	5	FDD	IMD4
	n71	695.5	5	25	649.5	N/A	FDD	N/A
only be verifie NOTE 4: This band is NOTE 5: Applicable or NOTE 6: TBD NOTE 7: TBD NOTE 8: TBD NOTE 9: TBD NOTE 10: There is no II	15kHz SCS is ents apply whe within the dow ed when this is subject to IMD hly if operation	assumed. n there is at nlink transm not the case 5 also which with 4 anten	least one ind hission band e (the require MSD is not ina ports is s	dividual RE width of the ements specified. specified in h77 operatin	within the int FDD band. ⁻ cified in claus the band wit g in 3450 – 5	ermodulatio The referenc se 7.3 apply h carrier age 3980 MHz a	n generate e sensitivit). gregation c	y should configured.

Table 7.3A.0.5-1a: 2DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations for PC2 CA

Band / Channel bandwidth / N _{RB} / Duplex mode											
NR CA Configuration	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL C _{LRB}	DL Fc (MHz)	MSD (dB)	Duplex mode				
CA_n1-n78	CA_n1-n78 n1 1950 5 25 2140 [17.8] FDD										
CA_n1-n78 n1 1950 5 25 2140 [17.8] FDD IMD n78 3710 10 50 3710 N/A TDD N/A											
	15 kHz SCS is	assumed. n there is at nlink transn	least one in nission band	dividual RE width of the	within the in FDD band.	termodulatic The reference	on generate ce sensitivi				

Table 7.3A.0.5-2: 3DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations

			dwidth / N _{RE}	-	node			Source o
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL F₀ (MHz)	MSD (dB)	Duplex mode	
CA_n1-n3-n28	n1	1975	5	25	2165	N/A	FDD	N/A
	n28	710.5	5	25	765.5	N/A	FDD	N/A
	n3	1723.5	5	25	1818.5	4.0	FDD	IMD5
	n3	1780	5	25	1875	N/A	FDD	N/A
	n28	710.5	5	25	765.5	N/A	FDD	N/A
	n1	1949	5	25	2139	11.0	FDD	IMD4
CA_n1-n3-n41	n1	1977.5	5	25	2167.5	N/A	FDD	N/A
	n3	1712.5	5	25	1807.5	N/A	FDD	N/A
	n41	2507.5	10	25	2507.5	5.0	TDD	IMD5
CA_n1-n3-n78	n1	1950	5	25	2140	N/A	FDD	N/A
	n3	1750	5	25	1845	N/A		N/A
	n78	3700	10	52	3700	28.4	TDD	IMD2
	n1	1950	5	25	2140	N/A	FDD	N/A
	n3	1770	5	25	1865	N/A		N/A
	n78	3360	10	52	3360	11.2	TDD	IMD4
	<u>n1</u>	1950	5	25	2140	N/A	FDD	N/A
	<u>n3</u>	1735	5	25	1830	27.9		IMD2
	n78	3780	10	52	3780	N/A	TDD	N/A
CA_n1-n5-n7	n1	1968	5	25	2158	N/A	FDD	N/A
	n7	2512	10	50	2632	N/A	FDD	N/A
	n5	835	5	25	880	1.0	FDD	IMD5
CA_n1-n5-n78	n1	1932	5	25	2122	18.1	FDD	IMD3
	n5	829	5	25	874	N/A	FDD	N/A
	n78	3780	10	50	3780	N/A	TDD	N/A
	n1	1975	5	25	2165	N/A	FDD	N/A
	n5	840	5	25	885	3.1	FDD	IMD5
	n78	3405	10	50	3405	N/A	TDD	N/A
	n1	1950	5	25	2140	N/A	FDD	N/A
	n5	830	5	25	875	N/A	FDD	N/A
	n78	3610	10	50	3610	15.7	TDD	IMD3
CA_n1-n7-n28	n1	1935	5	25	2125	N/A	FDD	N/A
	n7	2533	10	50	2653	30.0	FDD	IMD2
	n28	718	5	25	773	N/A	FDD	N/A
	n1	1935	5	25	2125	N/A	FDD	N/A
	n7	2510	10	50	2630	N/A	FDD	N/A
	n28	730	10	50	785	4.5	FDD	IMD5
CA_n1-n7-n78	n1	1977.5	5	25	2167.5	N/A	FDD	N/A
	n7	2507.5	5	25	2627.5	9.1	FDD	IMD4
	n78	3305	10	50	3305	N/A	TDD	N/A
	n1	1950	5	25	2140	8.7	FDD	IMD4
	n7	2510	10	50	2630	N/A	FDD	N/A
	n78	3580	10	50	3580	N/A	TDD	N/A
	<u>n1</u>	1970	5	25	2160	N/A	FDD	N/A
	n7	2520	5	25	2640	N/A	FDD	N/A
0.4 0.0 70	n78	3390	10	50	3390	10.1	TDD	IMD4
CA_n1-n28-n78		1960	5	25	2150	15.7	FDD	IMD3
	n28	740	5	25	795	N/A	FDD	N/A
	n78	3630	10	50	3630	N/A	TDD	N/A
	n1	1970	5	25	2160	N/A	FDD	N/A
	n28	739	5	25	794	4.2	FDD	IMD5
	n78	3352	10	50	3352	N/A	TDD	N/A
	n1	1950	5	25	2140	N/A	FDD	N/A
	n28	733	5	25	788	N/A	FDD	N/A
04 = 4 = 77 = 70	n78	3416	10	50	3416	15.7	TDD	IMD3
CA_n1-n77-n79	n1	1950	5	25	2140	6.0	FDD	IMD3 ¹
	n77	3400	10	50	3400	N/A	TDD	N/A
	n79	4660	40	216	4660	N/A	TDD	N/A

Band / Channel bandwidth / N _{RB} / Duplex mode											
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode				
CA_n1-n78-n79	n1	1950	5	25	2140	N/A	FDD	N/A			
	n78	3410	10	50	3410	N/A	TDD	N/A			
	n79	4870	40	216	4870	15.9	TDD	IMD3 ^{1,3}			
	n1	1950	5	25	2140	N/A	FDD	N/A			
	n78	3490	10	50	3490	4.6	TDD	IMD5 ³			
	n79	4670	40	216	4670	N/A	TDD	N/A			
	n1	1950	5	25	2140	15.6	FDD	IMD3 ^{1,2}			
	n78	3400	10	50	3400	N/A	TDD	N/A			
	n79	4660	40	216	4660	N/A	TDD	N/A			
CA_n2-n5-n30	n2	1870	5	25	1959	N/A	FDD	N/A			
	n5	835	5	25	880	9.7	FDD	IMD4			
	n30	2310	10	50	2355	N/A	FDD	N/A			
CA_n2-n5-n66	n2	1900	5	25	1980	N/A	FDD	N/A			
	n5	830	5	25	875	N/A	FDD	N/A			
	n66	1740	5	25	2140	7.2	FDD	IMD4			
CA_n2-n5-n77	n2	1907.5	5	25	1987.5	N/A	FDD	N/A			
	n5	842.5	5	25	887.5	3.8	FDD	IMD5			
	n77	3305	5	25	3305	N/A	TDD	N/A			
	n2	1907	5	25	1987	16.5	FDD	IMD3			
	n5	846.5	5	25	891.5	N/A	FDD	N/A			
	n77	3680	5	25	3680	N/A	TDD	N/A			
	n2	1880	5	25	1960	N/A	FDD	N/A			
	n5	830	5	25	875	N/A	FDD	N/A			
	n77	3540	10	50	3540	16.0	TDD	IMD3 ¹			
CA_n2-n12-n77	n2	1880	5	25	1960	16.5	FDD	IMD3 ²			
•••	n12	707.5	5	25	737.5	N/A	FDD	N/A			
	n77	3375	10	50	3375	N/A	TDD	N/A			
	n2	1900	5	25	1980	N/A	FDD	N/A			
	n12	707.5	5	25	737.5	N/A	FDD	N/A			
	n77	3315	10	50	3315	16.0	TDD	IMD3 ^{1,2}			
CA_n2-n14-n66	n2	1874	5	25	1954	N/A	FDD	N/A			
	n14	793	5	25	763	N/A	FDD	N/A			
	n66	1762	5	25	2162	7.6	FDD	IMD4			
	n2	1874	5	25	1954	7.2	FDD	IMD4			
	n14	793	5	25	763	N/A	FDD	N/A			
	n66	1770	5	25	2170	N/A	FDD	N/A			
CA_n2-n14-n77	n2	1880	5	25	1960	16.5	FDD	IMD3			
0A_112-111-4-11/1	n14	793	5	25	763	N/A	FDD	N/A			
	n77	3546	10	50	3546	N/A	TDD	N/A			
	n2	1880	5	25	1960	N/A	FDD	N/A			
	n14	793	5	25	763	N/A	FDD	N/A			
	n77	3466	10	50	3466	16.0	TDD	IMD3 ¹			
CA_n2-n30-n77	n2	1906	5	25	1986	8.6	FDD	IMD3			
0A_112-1130-1177	n30	2312	5	25	2357	0.0 N/A	FDD	N/A			
	n77	3305	10	50	3305	N/A	TDD	N/A			
		1905				N/A N/A	FDD	N/A			
	n2		5 5	25	1985						
	n30	2309		25	2354	10.6	FDD	IMD4 ¹			
	n77	3361	10	50	3361	N/A	TDD	N/A			
	n2	1870	5	25	1950	N/A	FDD	N/A			
	n30	2310	5	25	2355	N/A	FDD	N/A			
	n77	4180	10	50	4180	29.4	TDD	IMD2 ²			

	Band / C	hannel ban	dwidth / N _{RE}	/ Duplex r	node			Source of IMD
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	
CA_n2-n66-n77	n2	1880	5	25	1960	N/A	FDD	N/A
	n66	1740	5	25	2140	N/A	FDD	N/A
	n77	3620	10	50	3620	29.4	TDD	IMD2
	n2	1880	5	25	1960	N/A	FDD	N/A
	n66	1740	5	25	2140	N/A	FDD	N/A
	n77	3340	10	50	3340	8.9	TDD	IMD4
	n2	1860	5	25	1940	N/A	FDD	N/A
	n66	1750	5	25	2150	31.2	FDD	IMD2
	n77	4010	10	50	4010	N/A	TDD	N/A
	n2	1880	5	25	1960	N/A	FDD	N/A
	n66	1760	5	25	2160	10.3	FDD	IMD4
	n77	3480	10	50	3480	N/A	TDD	N/A
	n2	1860	5	25	1940	N/A	FDD	N/A
	n66	1740	5	25	2140	2.8	FDD	IMD5
	n77	3860	10	50	3860	N/A	TDD	N/A
	n2	1880	5	25	1960	32.1	FDD	IMD2
	n66	1740	5	25	2140	N/A	FDD	N/A
	n77	3700	10	50	3700	N/A	TDD	N/A
	n2	1880	5	25	1960	9.1	FDD	IMD4
	n66	1770	5	25	2170	N/A	FDD	N/A
	n77	3350	10	50	3350	N/A	TDD	N/A
	n2	1880	5	25	1960	2.1	FDD	IMD5
	n66	1760	5	25	2160	N/A	FDD	N/A
	n77	3620	10	50	3620	N/A	TDD	N/A
CA_n3-n5-n7	n3	1780	5	25	1875	N/A	FDD	N/A
	n5	845	5	25	890	N/A	FDD	N/A
	n7	2505	10	50	2625	30.0	FDD	IMD2 ⁴
	n3	1720	5	25	1815	N/A	FDD	N/A
	n5	835	5	25	880	19.0	FDD	IMD3
	n7	2560	10	50	2680	N/A	FDD	N/A
CA_n3-n5-n78	n3	1730	5	25	1825	N/A	FDD	N/A
CA_113-113-1170	n5	839	5	25	884	N/A	FDD	N/A
	n78	3408	10	50	3408	16.1	TDD	IMD3
	n3	1730	5	25	1825	N/A	FDD	N/A
	n5	839	5	25	884	N/A	FDD	N/A
	n78	3512	10	<u> </u>	3512	4.5	TDD	IMD5
	n3	1767 839	5 5	<u>25</u> 25	1862 884	<u>15.7</u> N/A	FDD FDD	IMD3 N/A
	n5		10	50		N/A N/A		N/A
CA_n3-n7-n28	n78 n3	3540 1747	5	25	3540 1842	N/A N/A	TDD FDD	N/A
07_113-117-1120	n3 n7	2543	5	25	2663	N/A	FDD	N/A
	n28	741	5	25	796	20.0	FDD	IMD2
	n3	1712.5	5	25	1807.5	N/A	FDD	N/A
	n7	2562	5	25	2682	17.0	FDD	IMD3
	n28	743	5	25	798	N/A	FDD	N/A
	n3	1737.5	5	25	1832.5	16.5	FDD	IMD2
	n7	2543	5	25	2663	N/A	FDD	N/A
<u>0</u> 4 m 2 m 7 m 7 0	n28	710.5	5	25	765.5	N/A	FDD	N/A
CA_n3-n7-n78	n3	1725	5	25	1820	17.6	FDD	IMD3
	n7	2565	5	25	2685	N/A	FDD	N/A
	n78	3310	10	50	3310	N/A	TDD	N/A
	n3	1725	5	25	1820	8.6	FDD	IMD4
	n7	2565	5	25	2685	N/A	FDD	N/A
	n78	3475	10	50	3475	N/A	TDD	N/A
	n3	1730	5	25	1825	N/A	FDD	N/A
	n7	2560	5	25	2680	N/A	FDD	N/A
	n78	3390	10	50	3390	16.1	TDD	IMD3

Band / Channel bandwidth / N _{RB} / Duplex mode										
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD		
CA_n3-n8-n78	n3	1730	5	25	1825	N/A	FDD	N/A		
	n8	910	5	25	955	N/A	FDD	N/A		
	n78	3550	10	50	3550	16.1	TDD	IMD3		
	n3	1730	5	25	1825	N/A	FDD	N/A		
	n8	910	5	25	955	N/A	FDD	N/A		
	n78	3370	10	50	3370	4.5	TDD	IMD5		
	n3	1725	5	25	1820	15.7	FDD	IMD3		
	n8	910	5	25	955	N/A	FDD	N/A		
	n78	3640	10	50	3640	N/A	TDD	N/A		
CA_n3-n18-n41	n18	820	5	25	865	N/A	FDD	N/A		
	n3	1720	5	25	1815	N/A	FDD	N/A		
	n41	2540	10	50	2540	[N/A]1	TDD	IMD2		
	n18	820	5	25	865	N/A	FDD	N/A		
	n3	1725	5	25	1820	N/A	FDD	N/A		
	n41	2630	10	50	2630	16.0	TDD	IMD3		
	n18	820	5	25	865	28.9	FDD	IMD2		
	n3	1765	5	25	1860	N/A	FDD	N/A		
	n41	2630	10	50	2630	N/A	TDD	N/A		
	n18	830	5	25	875	[19.0]	FDD	IMD3		
	n3	1725	5	25	1820	N/A	FDD	N/A		
	n41	2670	5	25	2670	N/A	TDD	N/A		
	n3	1755	5	25	1850	28.8	FDD	IMD2		
	n41	2670	10	50	2670	N/A	TDD	N/A		
	n18	820	5	25	865	N/A	FDD	N/A		
CA_n3-n28-n41	n3	1715	5	25	1810	N/A	FDD	N/A		
	n28	743	5	25	798	N/A	FDD	N/A		
	n41	2518	5	25	2518	27.4	TDD	IMD2		
	n3	1715	5	25	1810	N/A	FDD	N/A		
	n28	743	5	25	798	N/A	FDD	N/A		
	n41	2687	5	25	2687	15.9	TDD	IMD3		
CA_n3-n28-n77	n3	1720	5	25	1815	N/A	FDD	N/A		
CA_113-1120-1177	n28	733	5	25	788	N/A	FDD	N/A		
	n77	4173	10	<u>25</u> 50	4173	15.9	TDD	IMD3		
	n28	735	5	25	790	N/A	FDD	N/A		
	n77	3320	10	 50	3320	N/A N/A	TDD	N/A N/A		
	n3	1755	5	25	1850	17.0	FDD	IMD3		
			-			-		_		
	n3	1712.5	5	25	1807.5	N/A N/A	FDD	N/A N/A		
	n77	4195 715	10 5	50 25	4195		TDD	IMD3		
CA =2 = 20 = 70	n28				770	15.3	FDD			
CA_n3-n28-n78	n28	735	5	25	790	N/A	FDD	N/A		
	n78	3320	10	50	3320	N/A	TDD	IMD3		
	<u>n3</u>	1755	5	25	1850	17.3	FDD	N/A		
	n3	1750	5	25	1845	N/A	FDD	N/A		
	n28	743	5	25	798	N/A	FDD	N/A		
04 0 00 70	n78	3764	10	50	3764	4.5	TDD	IMD5		
CA_n3-n28-n79	n3	1770	5	25	1865	N/A	N/A	n3		
	n28	725	5	25	780	N/A	N/A	n28		
	n79	4585	40	216	4585	9.4	IMD4 ¹	n79		
	n3	1770	5	25	1865	N/A	N/A	n3		
	n79	4530	40	216	4530	N/A	N/A	n79		
	n28	725	5	25	780	10.3	IMD4	n28		
	n28	725	5	25	780	N/A	N/A	n28		
	n79	4770	40	216	4770	N/A	N/A	n79		
	n3	1775	5	25	1870	5.7	IMD5	n3		

	Band / C	hannel ban	dwidth / NR	₃ / Duplex r	node			Source of IMD
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	
CA_n3-40-n41	n3	1747.5	5	25	1842.5	1.0	FDD	IMD5
	n40	2347.5	5	25	2347.5	N/A	TDD	N/A
	n41	2600	10	50	2600	N/A	TDD	N/A
CA_n3-n41-n77	n3	1720	5	25	1815	N/A	FDD	N/A
	n77	3900	10	50	3900	N/A	TDD	N/A
	n41	2640	5	25	2640	5.3	TDD	IMD5
	n41	2620	5	25	2620	N/A	TDD	N/A
	n77	3400	10	50	3400	N/A	TDD	N/A
	n3	1745	5	25	1840	16.4	FDD	IMD3
	n41	2580	5	25	2580	N/A	TDD	N/A
	n3	1720	5	25	1815	N/A	FDD	N/A
	n77	3440	10	50	3440	16.8	TDD	IMD31
CA_n3-n41-n78	n3	1730	5	25	1825	N/A	FDD	N/A
	n41	2560	10	50	2560	N/A	TDD	N/A
	n78	3390	10	50	3390	16.4	TDD	IMD3
	n3	1745	5	25	1840	16.4	TDD	IMD3
	n41	2620	5	25	2620	N/A	FDD	N/A
	n78	3400	10	50	3400	N/A	TDD	N/A
CA_n3-n77-n79	n77	TBD	TBD	TBD	TBD	N/A	FDD	N/A
—	n79	TBD	TBD	TBD	TBD	N/A	TDD	N/A
	n3	TBD	TBD	TBD	TBD	TBD	TDD	IMD3 ^{1, 2}
CA_n5-n7-n78	n5	834	5	25	879	30.2	FDD	IMD2
—	n7	2550	5	25	2670	N/A	FDD	N/A
	n78	3429	10	50	3429	N/A	TDD	N/A
	n5	830	5	25	875	3.3	FDD	IMD5
	n7	2525	5	25	2645	N/A	FDD	N/A
	n78	3350	10	50	3350	N/A	TDD	N/A
	n5	844	5	25	889	N/A	FDD	N/A
	n7	2525	5	25	2645	30.1	FDD	IMD2
	n78	3489	10	50	3489	N/A	TDD	N/A
	n5	835	5	25	880	N/A	FDD	N/A
	n7	2540	5	25	2660	N/A	FDD	N/A
	n78	3375	10	50	3375	29.7	TDD	IMD2
	n5	835	5	25	880	N/A	FDD	N/A
	n7	2550	5	25	2670	N/A	FDD	N/A
	n78	3430	10	50	3430	9.7	TDD	IMD4

Band / Channel bandwidth / N _{RB} / Duplex mode											
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL F₀ (MHz)	MSD (dB)	Duplex mode	IMD			
CA_n5-n12-n77	n5	835	5	25	880	3.9	FDD	IMD5			
	n12	707.5	5	25	737.5	N/A	FDD	N/A			
	n77	3710	10	50	3710	N/A	TDD	N/A			
	n5	835	5	25	880	N/A	FDD	N/A			
	n12	710	5	25	740	4.4	FDD	IMD5			
	n77	4080	10	50	4080	N/A	TDD	N/A			
	n5	830	5	25	875	N/A	FDD	N/A			
	n12	707.5	5	25	737.5	N/A	FDD	N/A			
	n77	3905	10	50	3905	4.4	TDD	IMD5			
CA_n5-n14-n77	n5	835	5	25	880	3.9	FDD	IMD5			
	n14	793	5	25	763	N/A	FDD	N/A			
	n77	4052	10	50	4052	N/A	TDD	N/A			
	n5	846.5	5	25	891.5	N/A	FDD	N/A			
	n14	795.5	5	25	765.5	11.6	FDD	IMD4 ¹			
	n77	3305	10	50	3305	N/A	TDD	N/A			
	n5	835	5	25	880	N/A	FDD	N/A			
	n14	793	5	25	763	N/A	FDD	N/A			
	n77	3298	10	50	3298	10.3	TDD	IMD4 ¹			
CA_n5-n25-n66	n5	834	5	25	879	N/A	FDD	N/A			
	n25	1900	5	25	1980	N/A	FDD	N/A			
	n66	1712	5	25	2132	7.2	FDD	IMD4			
CA_n5-n25-n77	n5	830	5	25	875	N/A	FDD	N/A			
	n25	1880	5	25	1960	N/A	FDD	N/A			
	n77	3540	10	50	3540	16.0	TDD	IMD3			
	n5	844	5	25	889	3.8	FDD	IMD5			
	n25	1907	5	25	1987	N/A	FDD	N/A			
	n77	3305	10	50	3305	N/A	TDD	N/A			
	n5	846.5	5	25	891.5	N/A	FDD	N/A			
	n25	1907	5	25	1987	16.5	FDD	IMD3			
	n77	3680	10	25	3680	N/A	TDD	N/A			
CA_n5-n25-n78	n5	830	5	25	875	N/A	FDD	N/A			
	n25	1900	5	25	1980	N/A	FDD	N/A			
	n78	3560	10	50	3560	16.1	TDD	IMD3			
CA_n5-n30-n66	n5	830	5	25	875	N/A	FDD	N/A			
	n30	2307.5	5	25	2352.5	N/A	FDD	N/A			
	n66	1725	5	25	2125	4	FDD	IMD5			
CA_n5-n30-n77	n5	835	5	25	880	15.2	FDD	IMD3			
	n30	2310	5	25	2355	N/A	FDD	N/A			
	n77	3740	10	50	3740	N/A	TDD	N/A			
	n5	835	5	25	880	N/A	FDD	N/A			
	n30	2310	5	25	2355	13.2	FDD	IMD3			
	n77	4025	10	50	4025	N/A	TDD	N/A			
	n5	840	5	25	885	N/A	FDD	N/A			
	n30	2310	5	25	2355	N/A	FDD	N/A			
	n77	3780	10	50	3780	16.1	TDD	IMD3			

Band / Channel bandwidth / NRB / Duplex mode											
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD			
CA_n5-n66-n77	n5	830	5	25	875	N/A	FDD	N/A			
	n66	1750	5	25	2150	N/A	FDD	N/A			
	n77	3410	10	50	3410	16.1	TDD	IMD3			
	n5	826.5	5	25	871.5	N/A	FDD	N/A			
	n66	1712.5	5	25	2112.5	N/A	FDD	N/A			
	n77	4192	10	50	4192	8.2	TDD	IMD4			
	n5	830	5	25	875	N/A	FDD	N/A			
	n66	1750	5	25	2150	N/A	FDD	N/A			
	n77	3590	10	50	3590	3.3	TDD	IMD5			
	n5	830	5	25	875	N/A	FDD	N/A			
	n66	1730	5	25	2130	14.4	FDD	IMD3			
	n77	3790	10	50	3790	N/A	TDD	N/A			
CA_n5-n66-n78	n5	830	5	25	875	N/A	FDD	N/A			
	n66	1720	5	25	2120	N/A	FDD	N/A			
	n78	3380	10	50	3380	16.1	TDD	IMD3			
CA_n5-n66-n78	n5	830	5	25	875	N/A	FDD	N/A			
	n66	1720	5	25	2120	13.2	FDD	IMD3			
	n78	3780	10	50	3780	N/A	TDD	N/A			
CA_n7-n25-n78	n7	2550	5	25	2670	N/A	FDD	N/A			
	n25	1870	5	25	1950	8.6	FDD	IMD4			
	n78	3525	10	50	3525	N/A	TDD	N/A			
	n7	2520	5	25	2640	N/A	FDD	N/A			
	n25	1905	5	25	1985	N/A	FDD	N/A			
	n78	3750	10	50	3750	4.5	TDD	IMD5			
CA_n7-n28-n78	n7	2567.5	5	25	2687.5	N/A	FDD	N/A			
_	n28	727.5	5	25	782.5	28.8	FDD	IMD2			
	n78	3350	10	50	3350	N/A	TDD	N/A			
	n7	2567.5	5	25	2687.5	N/A	FDD	N/A			
	n28	727.5	5	25	782.5	3.0	FDD	IMD5			
	n78	3460	10	50	3460	N/A	TDD	N/A			
	n7	2530	5	25	2650	30.5	FDD	IMD2			
	n28	740	5	25	795	N/A	FDD	N/A			
	n78	3390	10	50	3390	N/A	TDD	N/A			
	n7	2565	5	25	2685	N/A	FDD	N/A			
	n28	745	5	25	800	N/A	FDD	N/A			
	n78	3310	10	50	3310	29.7	TDD	IMD2			
	n7	2550	5	25	2670	N/A	FDD	N/A			
	n28	720	5	25	775	N/A	FDD	N/A			
	n78	3714	10	50	3714	9.7	TDD	IMD4			
CA_n7-n66-n77	n7	2560	5	25	2680	N/A	FDD	N/A			
	n66	1730	5	25	2130	N/A	FDD	N/A			
	n77	3390	10	50	3390	16.1	TDD	IMD3			
	n7	2550	5	25	2670	N/A	FDD	N/A			
	n66	1750	5	25	2150	8.7	FDD	IMD4			
	n77	3625	10	50	3625	N/A	TDD	N/A			
	n7	2520	5	25	2640	3.4	FDD	IMD5			
	n66	1720	5	25	2120	N/A	FDD	N/A			
	n77	3900	10	50	3900	N/A	TDD	N/A			
	n7	2520	5	25	2640	N/A	FDD	N/A			
	n66	1760	5	25	2160	N/A	FDD	N/A			
	n77	4040	10	50	4040	4.2	TDD	IMD5			
CA_n7-n66-n78	n7	2560	5	25	2680	N/A	FDD	N/A			
	n66	1730	5	25	2130	N/A	FDD	N/A			
	n78	3390	10	50	3390	16.1	TDD	IMD3			
	n7	2550	5	25	2670	N/A	FDD	N/A			
	n66	1750	5	25	2150	8.7	FDD	IMD4			
		1100	J	20	2100	0.7		111104			

Band / Channel bandwidth / NRB / Duplex mode										
NR CA band combination	NR band	UL F₀ (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD		
CA_n12-n30-n77	n12	710	5	25	740	15.2	FDD	IMD3 ¹		
	n30	2310	5	25	2355	N/A	FDD	N/A		
	n77	3880	10	50	3880	N/A	TDD	N/A		
	n12	707.5	5	25	737.5	N/A	FDD	N/A		
	n30	2310	5	25	2355	13.2	FDD	IMD3		
	n77	3770	10	50	3770	N/A	TDD	N/A		
	n12	707	5	25	737	N/A	FDD	N/A		
	n30	2310	5	25	2355	N/A	FDD	N/A		
	n77	3913	10	50	3913	16.0	TDD	IMD3		
CA_n12-n66-n77	n12	710	5	25	740	15.2	FDD	IMD3		
	n66	1720	5	25	2120	N/A	FDD	N/A		
	n77	4180	10	50	4180	N/A	TDD	N/A		
	n12	707	5	25	737	N/A	FDD	N/A		
	n66	1746	5	25	2146	13.2	FDD	IMD3		
	n77	3560	10	50	3560	N/A	TDD	N/A		
	n12	704	5	25	734	N/A	FDD	N/A		
	n66	1723	5	25	2123	N/A	FDD	N/A		
	n77	4150	10	50	4150	16.0	TDD	IMD3 ^{1,2}		
CA_n13-n25-n66	n13	782	5	25	751	N/A	FDD	N/A		
	n66	1736	5	25	2156	72	FDD	IMD4		
	n25	1860	5	25	1940	N/A	FDD	N/A		
	n13	780	10	50	749	N/A	FDD	N/A		
	n25	1860	5	25	1940	6.2	FDD	IMD4		
	n66	1750	5	25	2150	N/A	FDD	N/A		
CA_n13-n25-n77	n13	782	5	25	751	N/A	FDD	N/A		
	n25	1880	5	25	1960	N/A	FDD	N/A		
	n77	3444	10	50	3444	17.3	TDD	IMD3 ^{1,2}		
	n13	782	5	25	751	N/A	FDD	N/A		
	n25	1880	5	25	1960	16.0	FDD	IMD3		
	n77	3524	10	50	3524	N/A	TDD	N/A		
CA_n13-n66-n77	n13	782	5	25	751	N/A	FDD	N/A		
	n66	1736	5	25	2136	17.1	FDD	IMD3		
	n77	3700	10	50	3700	N/A	TDD	N/A		
	n13	781	5	25	750	15.2	FDD	IMD3		
	n66	1710	5	25	2110	N/A	FDD	N/A		
	n77	4170	10	50	4170	N/A	TDD	N/A		
	n13	782	5	25	751	N/A	FDD	N/A		
	n66	1770	5	25	2170	N/A	FDD	N/A		
	n77	3334	10	50	3334	16.3	TDD	IMD3 ^{1,2}		
CA_n14-n30-n77	n14	793	5	25	763	15.2	FDD	IMD3 ¹		
	n30	2310	5	25	2355	N/A	FDD	N/A		
	n77	3857	10	50	3857	N/A	TDD	N/A		
	n14	793	5	25	763	N/A	FDD	N/A		
	n30	2310	5	25	2355	13.2	FDD	IMD3		
	n77	3941	10	50	3941	N/A	TDD	N/A		
	n14	793	5	25	763	N/A	FDD	N/A		
	n30	2310	5	25	2355	N/A	FDD	N/A		
	n77	3896	10	50	3896	16.0	TDD	IMD3		
CA_n14-n66-n77	n14	793	5	25	763	15.2	FDD	IMD3		
	n66	1712.5	5	25	2112.5	N/A	FDD	N/A		
	n77	4188	10	50	4188	N/A	TDD	N/A		
	n14	793	5	25	763	N/A	FDD	N/A		
	n66	1755	5	25	2155	13.2	FDD	IMD3		
	n77	3741	10	50	3741	N/A	TDD	N/A		
	n14	793	5	25	763	N/A	FDD	N/A		
	n66	1755	5	25	2155	N/A	FDD	N/A		
	n77	3341	10	50	3341	16.0	TDD	IMD3 ^{1,2}		

Band / Channel bandwidth / N _{RB} / Duplex mode											
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD			
CA_n25-n38-n78	n25	1852.5	5	25	1932.5	16.4	FDD	IMD3			
	n38	2617.5	5	25	2617.5	N/A	TDD	N/A			
	n78	3305	10	50	3305	N/A	TDD	N/A			
	n25	1870	5	25	1950	N/A	FDD	N/A			
	n38	2610	5	25	2610	N/A	TDD	N/A			
	n78	3350	10	50	3350	14.8	TDD	IMD3			
	n25	1880	5 5	25 25	1960	8.6 N/A	TDD FDD	IMD4 N/A			
	n38 n78	2570 3550	5 10	50	2570 3550	N/A N/A	TDD	N/A N/A			
CA_n25-n41-n66	n25	1860	5	25	1940	11.0	FDD	IMD4			
CA_1123-1141-1100	n41	2685	10	50	2685	N/A	TDD	N/A			
	n66	1715	5	25	2115	N/A	FDD	N/A			
CA_n25-n41-n77	n25	1870	5	25	1950	N/A	FDD	N/A			
	n41	2610	5	25	2610	N/A	TDD	N/A			
	n77	3350	10	50	3350	14.8	TDD	IMD3			
	n25	1900	5	25	1980	N/A	FDD	N/A			
	n41	2525	5	25	2645	N/A	TDD	N/A			
	n77	3775	10	50	3775	4.2	TDD	IMD5			
	n25	1870	5	25	1950	N/A	FDD	N/A			
	n41	2640	5	25	2640	5.3	TDD	IMD5			
	n77	4125	10	50	4125	N/A	TDD	N/A			
	n25	1870	5	25	1950	17.6	FDD	IMD3			
	n41	2565	5	25	2565	N/A	TDD	N/A			
	n77	3180	10	50	3310	N/A	TDD	N/A			
	n25	1870	5	25	1950	8.6	FDD	IMD4			
	n41	2550	5	25	2685	N/A	TDD	N/A			
04 = 05 = 44 = 70	n77	3525	10	50	3475	N/A	TDD	N/A			
CA_n25-n41-n78	n25 n41	1870 2610	5 5	25 25	1950 2610	N/A N/A	FDD TDD	N/A N/A			
	n78	3350	10	50	3350	14.8	TDD	IMD3			
	n25	1900	5	25	1980	N/A	FDD	N/A			
	n41	2525	5	25	2645	N/A	TDD	N/A			
	n78	3775	10	50	3775	4.2	TDD	IMD5			
	n25	1870	5	25	1950	17.6	FDD	IMD3			
	n41	2565	5	25	2565	N/A	TDD	N/A			
	n78	3180	10	50	3310	N/A	TDD	N/A			
	n25	1870	5	25	1950	8.6	FDD	IMD4			
	n41	2550	5	25	2685	N/A	TDD	N/A			
	n78	3525	10	50	3475	N/A	TDD	N/A			
CA_n25-n48-n66	n25	1900	5	25	1980	N/A	FDD	N/A			
	n48	3540	10	50	3540	N/A	TDD	N/A			
	n66	1760	5	25	2160	10.4	FDD	IMD4			
	n25	1880	5	25	1960	N/A	FDD	N/A			
	n48	3620	10	50	3620	29.4	TDD	IMD2			
	n66	1740	5	25	2140	N/A	FDD	N/A			
	n25	1880	5	25	1960	32.1	FDD	IMD2 ¹			
	n48	3700	10	50	3700	N/A	TDD	N/A			
	n66	1740	5	25	2140	N/A	FDD	N/A			

Band / Channel bandwidth / N_{RB} / Duplex mode											
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD			
CA_n25-n66-n77	n25	1900	5	25	1980	N/A	FDD	N/A			
	n66	1760	5	25	2160	29.2	FDD	IMD2			
	n77	4060	10	50	4060	N/A	TDD	N/A			
	n25	1900	5	25	1980	N/A	FDD	N/A			
	n66	1760	5	25	2160	10.4	FDD	IMD4			
	n77	3540	10	50	3540	10	TDD	N/A			
	n25	1900	5	25	1980	N/A	FDD	N/A			
	n66	1760	5	25	2160	4.0	FDD	IMD5			
	n77	3930	10	50	3930	N/A	TDD	N/A			
	n25	1880	5	25	1960	32.1	FDD	IMD2			
	n66	1740	5	25	2140	N/A	FDD	N/A			
	n77	3700	10	50	3700	N/A	TDD	N/A			
	n25	1880	5	25	1960	9.1	FDD	IMD4			
	n66	1770	5	25	2170	N/A	FDD	N/A			
	n77	3350	10	50	3350	N/A	TDD	N/A			
	n25	1880	5	25	1960	2.1	FDD	IMD5			
	n66	1760	5	25	2160	N/A	FDD	N/A			
	n77	3620	10	50	3620	N/A	TDD	N/A			
	n25	1880	5	25	1960	N/A	FDD	N/A			
	n66	1740	5	25	2140	N/A	FDD	N/A			
	n77	3620	10	50	3620	29.4	TDD	IMD2			
	n25	1880	5	25	1960	N/A	FDD	N/A			
	n66	1740	5	25	2140	N/A	FDD	N/A			
	n77	3340	10	50	3340	8.9	TDD	IMD4			
CA_n25-n66-n78	n25	1880	5	25	1960	N/A	FDD	N/A			
	n66	1740	5	25	2140	N/A	FDD	N/A			
	n78	3620	10	50	3620	29.4	TDD	IMD2			
CA_n25-n71-n77	n25	1907.5	5	25	1987.5	N/A	FDD	N/A			
	n71	695.5	5	25	649.5	N/A	FDD	N/A			
	n77	3305	10	50	3305	8.0	TDD	IMD3 ^{1,2}			
	n25	1874	5	25	1954	16.5	FDD	IMD3 ²			
	n71	693	5	25	647	N/A	FDD	N/A			
	n77	3340	10	50	3340	N/A	TDD	N/A			
	n25	1907.5	5	25	1987.5	N/A	FDD	N/A			
	n71	695.5	5	25	649.5	N/A	FDD	N/A			
CA_n25-n71-n78	n78	3305	10	50	3305	8.0	TDD	IMD3			
	n25	1874	5	25	1954	16.5	FDD	IMD3			
	n25 n71	693	5 5	25 25	647	N/A	FDD	N/A			
	n78	3340	5 10	 50	3340	N/A N/A	TDD	N/A N/A			

Band / Channel bandwidth / NRB / Duplex mode												
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL C _{lrb}	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD				
CA_n28-n41-n77	n41	2642	5	25	2642	N/A	TDD	N/A				
	n77	3440	10	50	3440	N/A	TDD	N/A				
	n28	743	5	25	798	30.8	FDD	IMD2 ⁴				
	n41	2567.5	10	50	2567.5	N/A	TDD	N/A				
	n77	3460	10	50	3460	N/A	TDD	N/A				
	n28	727.5	5	25	782.5	3.0	FDD	IMD5				
	n28	738	5	25	793	N/A	FDD	N/A				
	n77	3380	10	50	3380	N/A	TDD	N/A				
	n41	2642	5	25	2642	29.5	TDD	IMD2				
	n41	2580	5	25	2580	N/A	TDD	N/A				
	n28	743	5	25	798	N/A	FDD	N/A				
	n77	3323	10	50	3323	28.2	TDD	IMD2 ²				
CA_n28-n41-n78	n28	738	5	25	793	N/A	FDD	N/A				
	n78	3380	10	50	3380	N/A	TDD	N/A				
	n41	2642	5	25	2642	29.5	TDD	IMD2				
	n41	2642	5	25	2642	N/A	TDD	N/A				
	n78	3440	10	50	3440	N/A	TDD	N/A				
	n28	743	5	25	798	30.8	FDD	IMD2				
	n41	2565	5	25	2565	N/A	TDD	N/A				
	n28	745	5	25	800	N/A	FDD	N/A				
<u></u>	n78	3310	10	50	3310	29.7	TDD	IMD2 ²				
CA_n28-n41-n79	n28	725	5	25	780	13.0	FDD	IMD3				
	n41	2600	10	50	2600	N/A	TDD	N/A				
	n79	4600	40	216	4600	N/A	TDD	N/A				
	n28	720	5	25	780	N/A	FDD	N/A				
	n41	2600	10	50	2600	N/A	TDD	N/A				
	n79	4480	40	216	4600	10.1	TDD	IMD3 ²				
	n28	735	5	25	790	N/A	FDD	N/A				
	n41	2645	10	50	2645	10.4	TDD	IMD4				
0.4 0.0 77 70	n79	4850	40	216	4850	N/A	TDD	N/A				
CA_n28-n77-n79	n77	3620	10	52	3620	N/A	N/A	n77				
	n79	4420	40	216	4420	N/A	N/A	n79				
<u> </u>	n28	745	5	25	800	16.2	IMD2 ^{1,2}	n28				
CA_n30-n66-n77	n30	2310	5	25	2355	29.2	FDD	IMD2				
	n66	1745	5	25	2145	N/A	FDD	N/A				
	n77	4100	10	50	4100	N/A	TDD	N/A				
	n30	2310	5	25	2355	N/A	FDD	N/A				
	n66	1760	5	25	2160	8.7	FDD	IMD4				
	n77	3390	10	50	3390	N/A	TDD	N/A				
	n30	2310	5	25	2355	N/A	FDD	N/A				
	n66	1745	5	25	2145	N/A	FDD	N/A				
04 = 00 = 00 = 70	n77	4055	10	50	4055	28.4	TDD	IMD2				
CA_n38-n66-n78	n38	2550	5	25	2550	N/A	TDD	N/A				
	n66	1750	5	25	2150	8.7	FDD	IMD4				
	n78	3625	10	50	3625	N/A	TDD	N/A				
	n38	2610	5	25	2610	N/A	TDD	N/A				
	n66	1760	5	25	2160	N/A	FDD	N/A				
<u>04 m20 m40 m70</u>	n78	3460	10	50	3460	15.0	TDD	IMD3				
CA_n39-n40-n79	n39	1917.5	5	25	1917.5	N/A	TDD	N/A				
	n40	2302.5	5	25	2302.5	N/A	TDD	N/A				
CA == 10 == 14 == 70	n79	4980	40	216	4980	5.8	TDD	IMD4				
CA_n40-n41-n79	n40	2340	5	25	2340	N/A	TDD	N/A				
	n41	2600	10	50	2600	N/A	TDD	N/A				
	n79	4940	40	216	4940	30.5	TDD	IMD				

Band / Channel bandwidth / NRB / Duplex mode											
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD			
CA_n41-n66-n77	n41	2560	5	25	2560	N/A	TDD	N/A			
	n66	1730	5	25	2130	N/A	FDD	N/A			
	n77	3390	10	50	3390	16.1	TDD	IMD3 ^{1,2}			
	n41	2670	5	25	2670	5.2	TDD	IMD5			
	n66	1715	5	25	2115	N/A	FDD	N/A			
	n77	4190	10	50	4190	N/A	TDD	N/A			
	n41	2530	5	25	2530	N/A	TDD	N/A			
	n66	1760	5	25	2160	9.0	FDD	IMD4			
	n77	3610	10	50	3610	N/A	TDD	N/A			
CA_n41-n66-n78	n41	2560	5	25	2560	N/A	TDD	N/A			
	n66	1730	5	25	2130	N/A	FDD	N/A			
	n77	3390	10	50	3390	16.1	TDD	IMD3 ¹			
	n41	2530	5	25	2530	N/A	TDD	N/A			
	n66	1760	5	25	2160	9.0	FDD	IMD4			
	n77	3610	10	50	3610	N/A	TDD	N/A			
CA_n41-n71-n77	n41	2615	5	25	2615	N/A	TDD	N/A			
	n71	693	5	25	647	N/A	FDD	N/A			
	n77	3308	10	50	3308	29.1	TDD	IMD2 ¹			
	n41	2615	5	25	2615	N/A	TDD	N/A			
	n71	693	5	25	647	N/A	FDD	N/A			
	n77	4001	10	50	4001	16.3	TDD	IMD3 ¹			
	n41	2580	5	25	2580	N/A	TDD	N/A			
	n71	693	5	25	647	N/A	FDD	N/A			
	n77	3774	10	50	3774	10.3	TDD	IMD4 ¹			
		2615		25		28.7	TDD	IMD4			
	n41	693	5 5		2615 647	 N/A		N/A			
	n71			25			FDD				
	n77	3308	10	50	3308	N/A	TDD	N/A			
	n41	2615	5	25	2615	15.5	TDD	IMD3			
	n71	693	5	25	647	N/A	FDD	N/A			
	n77	4001	10	50	4001	N/A	TDD	N/A			
	41	2642	5	25	2642	N/A	TDD	N/A			
	n71	743	5	25	798	30.8	FDD	IMD2			
	n77	3440	10	50	3440	N/A	TDD	N/A			
CA_n41-n71-n78	n41	2615	5	25	2615	N/A	TDD	N/A			
	n71	693	5	25	647	N/A	FDD	N/A			
	n78	3308	10	50	3308	29.1	TDD	IMD2 ¹			
	n41	2580	5	25	2580	N/A	TDD	N/A			
	n71	693	5	25	647	N/A	FDD	N/A			
	n77	3774	10	50	3774	10.3	TDD	IMD4 ¹			
	n41	2615	5	25	2615	28.7	TDD	IMD2			
	n71	693	5	25	647	N/A	FDD	N/A			
	n77	3308	10	50	3308	N/A	TDD	N/A			
	41	2642	5	25	2642	N/A	TDD	N/A			
	n71	743	5	25	798	30.8	FDD	IMD2			
	n77	3440	10	50	3440	N/A	TDD	N/A			
CA_n48-n66-n70	n48	3625	10	50	3625	N/À	TDD	N/A			
	n66	1742.5	5	25	2142.5	2.8	FDD	IMD5			
	n70	1702.5	5	25	2002.5	N/A	FDD	N/A			
CA_n48-n66-n71	n48	3552.5	10	50	3552.5	N/A	TDD	N/A			
	n66	1761.5	5	25	2161.5	14.4	FDD	IMD3			
	n71	695.5	5	25	649.5	N/A	FDD	N/A			
	n48	3695	10	50	3695	5.2	TDD	IMD4			
	n66	1712.5	5	25	2112.5	N/A	FDD	N/A			
	n71	665.5	5	25	619.5	N/A	FDD	N/A			

Band / Channel bandwidth / NRB / Duplex mode												
NR CA band combination	NR band	UL Fc (MHz)	UL/DL BW (MHz)	UL Clrb	DL Fc (MHz)	MSD (dB)	Duplex mode	IMD				
CA_n48-n70-n71	n48	3694	10	50	3694	9	TDD	IMD4 ¹				
	n70	1697.5	5	25	1997.5	N/A	FDD	N/A				
	n71	665.5	5	25	619.5	N/A	FDD	N/A				
CA_n66-n71-n77	n66	1720	5	25	2120	N/A	FDD	N/A				
	n71	668	5	25	622	N/A	FDD	N/A				
	n77	4108	10	50	4108	15.9	TDD	IMD3 ^{1,}				
	n66	1760	5	25	2160	15.5	FDD	IMD3 ²				
	n71	693	5	25	647	N/A	FDD	N/A				
	n77	3546	10	50	3546	N/A	TDD	N/A				
	n66	1720	5	25	2120	N/A	FDD	N/A				
	n71	686	5	25	640	15.3	FDD	IMD3				
	n77	4080	10	50	4080	N/A	TDD	N/A				
CA_n66-n71-n78	n66	1720	5	25	2120	N/A	FDD	N/A				
	n71	668	5	25	622	N/A	FDD	N/A				
	n78	3724	10	50	3724	9	TDD	IMD41				
	n66	1760	5	25	2160	15.5	FDD	IMD3				
	n71	693	5	25	647	N/A	FDD	N/A				
	n78	3546	10	50	3546	N/A	TDD	N/A				

NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation.

NOTE 4: This band is subject to IMD3 also which MSD is not specified. NOTE 5: Both of the transmitters shall be set min(+20 dBm, P_{CMAX_L,f,c}) as defined in clause 6.2A.4

7.3A.0.6 Reference sensitivity exceptions due to cross band isolation for CA

Sensitivity degradation is allowed for a band if it is impacted by UL of another band part of the same NR CA configuration due to cross band isolation issues. Reference sensitivity exceptions for the victim band are specified in Table 7.3A.0.6-1 with uplink configuration of the aggressor band specified in Table 7.3A.0.6-2.

				NR E	Band / Ch	annel ba	ndwidth c	of the affe	ected DL	band				
UL band	DL band	5 MHz (dB)	10 MHz (dB)	15 MHz (dB)	20 MHz (dB)	25 MHz (dB)	30 MHz (dB)	40 MHz (dB)	50 MHz (dB)	60 MHz (dB)	70 MHz (dB)	80 MHz (dB)	90 MHz (dB)	100 MHz (dB)
n1	n3	3	2.2	1.9	1.7	1.6	1.5	1.4						
n3	n41		0.7	0.7	0.7			0.7	0.7	0.7		0.7	0.7	0.7
n41	n3	0.6	0.6	0.6	0.6	0.6	0.6							
n71	n29	17.5	16.0											
n78	n71	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5					
n78	n41 ¹		4.5	4.5	4.5			4.5	4.5					
n78	n79							2	2	2		2		2
n79	n78		2.6	2.6	2.6			2.6	2.6	2.6		2.6	2.6	2.6
	NOTE 1 NOTE 2	: The rec	quirement	s only app	ly for UEs	s supportir	ng inter-ba	and carrie	is not app r aggrega band n78	tion with s			capability	

Table 7.24 0.6 1. Deference consistivit	v avaantiana (MCD) due to cross band isolation for NR CA FR1
Table 7.3A.0.0-1. Reference sensitivit		Jule to cross pand isolation for NR CA FR I

					NR Band	I/SCS/C	hannel bar	ndwidth of	the affect	ed DL ban	d				
UL band	DL band	SCS of UL band (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	70 MHz	80 MHz	90 MHz	100 MHz
n1	n3	15	25	25	25	25	25	25	25						
n3	n41	15		50	50	50			50	50	50		50	50	50
n41	n3	30	160	160	160	160	160	160							
n71	n29	15	20	20											
n78	n7	30	270	270	270	270	270	270	270	270					
n78	n41	30		270	270	270			270	270	270		270	270	270
n78	n79	30							270 ²	270 ²	270 ²		270 ²		270 ²
n79	n78	30		270 ²	270 ²	270 ²			270 ²	270 ²	270 ²		270 ²	270 ²	270 ²
	 NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.2.3-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2.3-3 applies. NOTE 2: Refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth in Table 5.3.2-1. NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. 													dwidth	

Table 7.3A.0.6-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1

The normative reference for this requirement is TS 38.101-1 [2] clause 7.3.A.

7.3A.1 Reference sensitivity power level for 2DL CA without exception

7.3A.1.1 Test purpose

To verify the ability of UE that support CA to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise when no CA exceptions are allowed and single carrier requirements apply.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3A.1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support NR 2DL CA.

7.3A.1.3 Minimum requirements

The minimum conformance requirements are defined in clause 7.3A.0.

- 7.3A.1.4 Test description
- 7.3A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3A.1.4.1-1, 7.3A.1.4.1-2 and 7.3A.1.4.1-3. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3A.1.4.1-1: Test Configuration Table for intra-band contiguous 2DL CA without exception

			Initial C	Conditions							
Test Envir subclause	ronment as spe e 4.1	cified in TS 38	3.508-1 [5]	Normal, TL/VL, TL/VH, TH/VL, TH/VH							
Test Freq subclause	uencies as spe e 4.3.1	cified in TS 38	5.508-1 [5]	Low range, High r	range						
subclause across ba UE.	Combination se Table 5.5A.1- ndwidth combir	1 for the CA C nation sets sup	onfiguration oported by the	Lowest N _{RB_agg} , H (NOTE 3)	lighest N _{RB_agg}						
Test SCS	as specified in	Table 5.3.5-1		Lowest							
			Test Parameters	CA Configuration	าร						
	nfiguration NRB	DL A	llocation		UL Allocatio	on					
PCC NRB	SCC NRB	CC MOD	PCC & SCC RB allocation	CC MOD		C RB allocations B @ RB _{start})					
Lowest N _{RB_agg} (NOTE 4)	Lowest N _{RB_agg} (NOTE 4)	CP-OFDM QPSK	Full RB	DFT-s-OFDM QPSK	REFSENS	-					
Highest N _{RB_agg} (NOTE 4)	Highest N _{RB_agg} (NOTE 4)	CP-OFDM QPSK	Full RB	DFT-s-OFDM QPSK	REFSENS	-					
Note 1: Note 2:				S and channel BW a RB allocation for ref		able 7.3.2.4.1-2.					
Note 3:	If the UE supp		CC Combinations		ation with the san	ne $N_{RB_{agg}}$, only the					
Note 4:											
Note 5	te 5: In a band where UE supports 4Rx, the test needs to be performed only with 4Rx antennas connected.										

						onditions							
Tes	st Enviro	nment as s	specified	in TS 38.5	508-1 [5] sub	clause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH						
Tes	st Freque	n TS 38.5	08-1 [5] subo	clause 4.3.1	Mid range for PCC and SCC with exceptions for CA configurations containing the following band combinations (Note 8):								
							CA_n1-n77: Mid in band n1 and Low in band n77 CA_n3-n77: TBD in band 3 and TBD in band 77. CA_n8-nX: Low range for PCC in Band 8 CA_n70-n71: High range for PCC in band 71. CA_n3-n78: Mid in band 3 and High in band 78. CA_n5-n78: Mid in band 5 and High in band 78 CA_n29-n71: Low in band 29 and High in band 71						
Tat con	ole 5.5A. nbinatior	nfiguration the UE.	pecified in su n across ban		Refer to "PCC N _{RB} "and "SCC N _{RB} " columns								
les	st SCS a	s specified	in ladie	5.3.5-1			Lowest						
Network signalling value						ameters for	carrier	-		ole 7.3.2.3-4	4 for the band with active uplink		
			CA Conf	iguration				ocatio		U	L Allocation (Note 2,3)		
ID		CA Configuration		PCC NRB	SCC NRB	CC MOD	PCC SC RE alloc	C B ati	CC MOD	PCC & SCC RB allocations (LCRB @ RBstart)			
	P Band	CC Range	S Band	CC Range									

Table 7.3A.1.4.1-2: Test Configuration Table for inter-band 2DL CA without exception

Default Test Settings for a CA_nXA-nYA Configuration											
1	nX	default	nY	default	Highest (Note 6)			Full RB	DFT-s- OFDM QPSK	REFSENS	-
2	nY	default	nX	default	Highest (Note 6)	Highest	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSENS	-
Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.											
Note 2: Use CA Configuration – specific test points if present in the table, otherwise use test points from matching Group Test											
Settings, if present in the table. Otherwise use the Default Test Settings test points.											
Note 3: X,Y correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n3A, X=1, Y=3.											
Note 4: REFSENS refers to the PCC bands and PCC N _{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.2.4.1-3.											
Note 5: For band combinations including operating band without uplink band (as noted in Table 5.2-1), only the CA configuration where PCC band has uplink band shall be tested.											
Not	Note 6: For NR band n70, DL 25 MHz / UL 15 MHz shall be configured (as specified in clause 5.3.6).										
Not	te 7: In a band where UE supports 4Rx, the test needs to be performed only with 4Rx antennas connected.										
Not	e 8:	For NR band n28, 30MHz test channel bandwidth is tested with Low range test frequencies.									
Not		CA_n29A-n71A is tested according to reference sensitivity levels specified in Clause 7.3A.1_1.5 due to cross band									
	isolation exception specified in Table 7.3A.0.6-1										

	Initial Conditions												
Tes	st Enviro	nment as	in TS 38.5	08-1 [5] sub	clause 4.1	Norm	Normal, TL/VL, TL/VH, TH/VL, TH/VH						
Tes	st Freque	encies as s	in TS 38.5	08-1 [5] sub	clause 4.3	.1 For t	For test frequencies refer to "Range" columns.						
Tab con Tes	Test CC Combination setting (CBW) as specified in subclause Table 5.5A.3.1-1 for the CA Configuration across bandwidth combination sets supported by the UE. Test SCS as specified in Table 5.3.5-1 Network signalling value							Refer to "PCC NRB" and "SCC NRB" columns Lowest NS_01 Unless given by Table 7.3.2.3-4 for the band with active uplink carrier for CA Configurations					
			C	A Config	uration / CB	W		DL Allocation			UL Allocation (Note 2,3)		
ID	CA Configuration PCC SCC		1	PCC	W _{gap} / [MHz]	SCC	CC MOD	PCC SCC RE alloc on CC SCC RE	C ati	CC MOD	РСС & SCC RB allocations (L _{CRB} @ RB _{start})		

Default Test Settings for a CA_nX(2A) Configuration												
1	nX	CC1	nX	CC2	Highest	Max (NOTE 4)	Lowest	CP-OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSENS	-
2	nX	CC1	nX	CC2	Highest N _{RB_agg} (NOTE 5)	Max (NOTE 4)	Highest N _{RB_agg} (NOTE 5)	CP-OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSENS	-
Test Settings for a CA_n71(2A) Configuration												
1	n71	CC1	n71	CC2	5MHz	5.0	5MHz	CP-OFDM QPSK	Full RB	DFT-s- OFDM QPSK	20@0	-
Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration. Note 2: Use CA Configuration – specific test points if present in the table, otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points. Note 3: REFSENS refers to the PCC bands and PCC NRB 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.2.4.1-3.												
	 The Wgap is defined to be widest possible on band based on the PCC and SCC configuration If the UE supports multiple CC Combinations in the CA Configuration with the same NRB_agg, only the combination with the highest NRB_PCC is tested 										n the	
Note 6: In a band where UE supports 4Rx, the test needs to be performed only with 4Rx antennas connected.												

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and Reference Measurement Channel is set according to Tables 7.3A.1.4.1-1, 7.3A.1.4.1-2 and 7.3A.1.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3A.1.4.3.

7.3A.1.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.3A.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1-1 for C_RNTI to transmit the DL RMC according to Tables 7.3A.1.4.1-1, 7.3A.1.4.1-2 and 7.3A.1.4.1-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.3A.1.4.1-1, 7.3A.1.4.1-2 and 7.3A.1.4.1-3 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level to the appropriate REFSENS value defined in Tables 7.3.2.5-1, 7.3.2.5-2. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the throughput measurement. Allow at least 200ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
- 7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.

7.3A.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.3A.1.5 Test requirement

For 2DL carrier aggregation, test parameters are specified in table 7.3A.1.4.1-1, 7.3A.1.4.1-2 and 7.3A.1.4.1-3. For the CA configurations listed in table 7.3A.1.5-1, the throughput of each component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with reference power level specified in table 7.3.2.5-1 for non-SDL carrier for 2 Rx antenna port, in table 7.3.2.5-2 for non-SDL carrier for 4 Rx antenna port and in table 7.3A.1.5-2 for SDL carrier with following additional requirements:

The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

For the UE which supports inter-band carrier aggregation, the test requirement for reference sensitivity shall be increased by the amount given by $\Delta R_{IB,c}$ defined in clause 7.3A.0.3 for the applicable operating bands. Unless otherwise stated, $\Delta R_{IB,c}$ is set to zero.

For intra-band non-contiguous 2 DL CA, the test requirement for shall be increased by ΔR_{IBNC} given in Table 7.3A.0.2.2-1 for the SCC. Unless given by Table 7.3.2.3-4, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.3.1-1) configured.

Carrier aggregation type	DL CA configuration	UL CA configuration
	CA_n40B	-
	CA_n41C	-
Intra-band contiguous 2DL CA	CA_n66B	-
	CA_n77C	-
Γ	CA_n78B	-
Γ	CA_n78C	-
	CA_n66(2A)	-
Intra-band non-contiguous 2DL CA	CA_n77(2A)	-
Γ	CA_n78(2A)	-
F	CA_n71(2A)	-
	CA_n1A-n3A	
	CA_n1A-n77A	-
F	CA_n1A-n78A	-
F	CA_n2A-n48A	-
	CA_n2A-n66A	-
F	CA_n2A-n77A	-
F	CA_n3A-n5A	
F	CA_n3A-n41A	
F	CA_n3A-n77A	-
Inter-band 2DL CA	CA_n3A-n78A	-
	CA_n5A-n66A	-
F	CA_n5A-n77A	-
	CA_n5A-n78A	
	CA_n8A-n78A	-
F	CA_n24A-n41A	
F	CA_n24A-n48A	
	CA_n24A-n77A	
F	CA_n28A-n41A	-
F	CA_n28A-n79A	-
F	CA_n41A-n79A	-
	CA_n66A-n70A	-
F	CA_n66A-n71A	
	CA_n70A-n71A	
SDL configuration	CA_n29A-n66A	-
	CA_1129A-1100A CA_129A-170A	-
H	CA_129A-170A CA_n29A-n71A (NOTE 1)	-
Iote 1: CA n29A-71A reference sens	sitivity requirement is tested in Clause 7.	

Table 7.3A.1.5-1: Reference sensitivity requirement for 2DL CA

Table 7.3A.1.5-2: Reference sensitivity	v for SDL bands

NR band	SCS (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
	. ,	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
	15	-97.0	-93.8										
n29													
129	30												
Note 1:	Note 1: TT for each frequency and channel bandwidth is specified in Table 7.3.2.5-3.												

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, throughput of each downlink component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) and parameters specified in Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, Table 7.3.2.4.1-3, Table 7.3.2.5-1, Table 7.3.2.5-2 and Table 7.3A.1.4-1 with the reference sensitivity power level increased by ΔR_{IBNC} given in Table 7.3A.0.2.2-1 for the SCC(s). For aggregation of two downlink FDD carriers with one uplink carrier the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.0.2.2-1. The requirements apply with all downlink carriers

active. Unless given by Table 7.3.2.3-4, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.3.1-1) configured.

For band combinations including operating bands without uplink band (as noted in Table 5.2-1), the requirements are specified in Table 7.3A.1.5-1 and for any band with uplink the uplink configuration specified in Table 7.3.2.4.1-2. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels, as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one-sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal, as described in Annex A.5.1.1/A.5.2.1). The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

7.3A.1_1Reference sensitivity power level for 2DL CA exceptions

Editor's Note: The following aspects are either missing or not yet determined:

- Test point analysis for CA_n3A-n5A IMD2 and IMD4 is currently missing in TR 38.905.

7.3A.1_1.1 Test purpose

To verify the ability of UE that support CA to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise when CA exceptions are allowed.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3A.1_1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support NR 2DL CA

7.3A.1_1.3 Minimum requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.1_1.4 Test description

7.3A.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3A.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3A.1_1.4.1-1: Test Configuration Table for inter-band 2DL CA exceptions

						Init	itial Conditions						
sub	clause 4	1.1	-		3.508-1 [5]		Normal,	TL/VL	., TL/V	H, TH/VL,	TH/VH		
	st Freque		specified	d in TS 38	8.508-1 [5]		For test	freque	encies	refer to "R	ange" columns.		
sub	clause 7	Table 5.5A	A.3.1-1 fo	or the CA	s specified Configurat	tion	Refer to "PCC N _{RB} "and "SCC N _{RB} " columns						
		s specifie					Lowest						
Net	work sig	ınalling va	llue				NS_01 Unless g	given b	oy Tab	le 7.3.2.3-	4 for the band with a	ctive uplink carrier	
					Test	Paramete	ers for CA	Conf	igurat	ions			
		C	A Config	juration /	CBW		DL A	llocati	on		UL Allocation (I	Note 2)	
ID	CA Configuration PCC SCC						CC MOD	S(R allo	C & CC B catio	CC MOD		B allocations RB _{start})	
	PCC SCC							PCC	scc				
	Band Range Band Range												
		10.70		1	Test Se	ettings for	CA_n1A	-n3A (Config		l		
	n1	1950 MHz (UL)	n3	1760 MHz	5MHz	5MHz	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_3	
1	n1	Low	n3	High	5MHz	Highest	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_4		
					Test Se	ettings for	CA_n1A	-n8A (Config	uration			
1	n1	1965 MHz (UL)	n8	887,5 MHz	5MHz	5MHz	CP- OFDM QPSK	CP- DFDM Full RB		DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_3	
	•	-	•	-	Test Se	ttings for	CA_n1A-	n77A	Config	guration			
1	n1	Mid	n77	3900 MHz	20 MHz	Highest	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-	
2	n1	Mid	n77	3870 MHz	20 MHz	20 MHz	CP- OFDM QPSK	Ful	RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-	

					Test	Paramete	ers for CA	A Conf	igurat	ions	
		CA	A Config	juration /	CBW		DL A	llocati	on		UL Allocation (Note 2)
ID		CA Conf	iguratio	n	PCC	SCC	CC MOD	PC SC R alloc	C	CC MOD	PCC & SCC RB allocations (L _{CRB} @ RB _{start})
	Р	CC	S	CC				с С	Ŋ		
	Band	Range	Band	Range				P	SC		

					Test Se	ttings for	CA_n1A-	n78A Config	guration		
1	n1	1950 MHz (UL)	n78	3710 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
		1			Test Se	ttings for	CA_n2A-	n48A Config			I
1	n2	1860 MHz (UL)	n48	3700 MHz	20 MHz	20 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
2	n2	UL 1852.5 /DL 1932.5	n48	3625 MHz	5 MHz	20 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
					Test Se	ttings for	CA_n2A-	n66A Config	•		
1	n2	UL 1855/ DL 1935	n66	UL 1775/ DL 2175	5 MHz	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
2	n2	UL 1883.3 /DL 1963.3	n66	UL 1750/ DL 2150	5 MHz	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
					Test Se	ttings for	CA_n2A-	n77A Config	guration		
1	n2	1860 MHz (UL)	n77	3720 MHz	20 MHz	100 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
2	n2	1860 MHz (UL)	n77	3700 MHz	20 MHz	20 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
3	n2	DL Mid	n77	3920 MHz	20 MHz	100 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	-	REFSENS_CA_ 2
4	n2	UL 1855/ DL 1935	n77	3790 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
5	n2	UL 1900/ DL 1980	n77	3720 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
6	n2	UL 1885/ DL 1965	n77	3810 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
					Test Se	ettings for	CA_n3A	n5A Config		-	
1	n3	TBD	n77	TBD	Highest	Highest	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
2	n3	1721 MHz (UL)	n5	838 MHz	10 MHz	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_3
					Test Se	ttings for	CA_n3A-	n77A Config			
1	n3	TBD	n77	TBD	Highest	Highest	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-

2	n3	TBD	n77	TBD	Highest	20 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
					Test Sett	ings for a	CA_n5A	n66A Confi	guration		
1	n5	UL 838/D L 883	n66	UL 1721/ DL 2121	5 MHz	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
					Test Sett	ings for a	CA_n5A	_n77A Confi	guration		
1	n5	834 MHz (UL)	n77	3336 MHz	20 MHz	100 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
2	n5	834 MHz (UL)	n77	4170 MHz	20 MHz	20 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
3	n5	DL Mid	n77	3526 MHz	10 MHz	100 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	-	REFSENS_CA_ 2
4	n5	UL 844/ DL 889	n77	3421 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
5	n5	UL 829/ DL 874	n77	4190 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
					Test Set	tings for C	A_n70A-	n71A Config	guration		
1	n71	Low	n70	Low	10 MHz	Highest	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1 with RB start 10	-
2	n71	Low	n70	Low	5 MHz	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1 with RB start 10	-
3	n70	1697.5 MHz (UL)	n71	695.5 MHz (UL)	5 MHz	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3

					Test	Paramete	ers for CA	A Confi	igurati	ions	
	CA Configuration / CBW						DL Allocation		UL Allocation (Note 2)		
ID		CA Conf	iguratio	n	PCC	SCC	CC MOD	PCO SC R alloc	C B	CC MOD	PCC & SCC RB allocations (L _{CRB} @ RB _{start})
	P	CC	S	CC				с С	cc		
	Band	Range	Band	Range				P	SC		

					Test Se	ttings for	CA_n3A-	n78A Config	guration		
1	n3	Mid	n78	3495 MHz	Highest	Highest	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
2	n3	Mid	n78	3465 MHz	20 MHz	20 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
3	n3	1740 MHz (UL)	n78	3575 ;MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
4	n3	1765 MHz (UL)	n78	3435 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
					Test Se	ttings for	CA_n5A-	n78A Config	guration		
1	n5	Mid	n78	3346 MHz	Highest	Highest	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
2	n5	Mid	n78	3316 MHz	20 MHz	20 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
					Test Se	ttings for	CA_n7A-	n78A Config	guration		
1	n7	High	n78	Low	50 MHz	Highest	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_4	-
					Test Se	ttings for	CA_n8A-	n78A Config			
1	n8	Mid	n78	3590 MHz	Highest	Highest	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-
2	n8	897.5 MHz (UL)	n78	3635 MHz	5 MHz	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
					Test Set	tings for O	CA_n26A	-n66A Confi	guration		
1	n66	1721 MHz (UL)	n26	838 MHz (UL)	5 MHz	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3
		•		•	Test Set	tings for C	CA_n29A	-n71A Confi			
1	n71	High	n29	Low	Highest	5 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_4	
2	n71	High	n29	Low	Highest	10 MHz	CP- OFDM QPSK	Full RB	DFT- s- OFDM QPSK	REFSENS_CA_4	

					Test	Paramete	ers for CA	Conf	igurat	ions			
		CA	A Config	juration /	CBW		DL A	llocati	on		UL Allocation (N	Note 2)	
ID		CA Conf	iguratio	n	PCC	SCC	CC MOD	SC R alloo	C & CC B catio	CC MOD	PCC & SCC R (L _{CRB} @		
	P	cc	S	сс			moe		1	mob			
	Band	Range	Band	Range				PCC	scc				
			1		Test Set	tings for (CA_n26A	-n70A	Confi	guration			
1	n70	1707.5 MHz (UL)	n26	838 MHz (UL)	5 MHz UL / 25 MHz DL	5 MHz	CP- OFDM QPSK	Full		DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3	
					Test Set	tings for C	CA_n48A	-n66A	Confi	-		I	
1	n48	3660 MHz (UL)	n66	1750 MHz (UL)	5 MHz	5 MHz	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3	
2	n66	High	n48	Low	5 MHz	10 MHz	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-	
3	n66	High	n48	Low	5 MHz	60 MHz	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-	
4	n66	High	n48	Mid	5 MHz	10 MHz	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_1	-	
					Test Set	tings for O	CA_n48A	-n70A	Confi	guration			
1	n48	3695 MHz (UL)	n70	1697.5 MHz (UL)	10 MHz	15 MHz UL / 25 MHz DL	CP- OFDM QPSK	Full	RB	DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3	
				-	Test Set	tings for (CA_n66A	-n71A	Confi	guration			
2	n66	1750 MHz (UL)	n71	675 MHz (UL)	5 MHz	5 MHz	CP- OFDM QPSK	Full		DFT- s- OFDM QPSK	REFSENS_CA_3	REFSENS_CA_ 3	
Not	ie 2: F a F a F a F ii F N	REFSENS according accordin	For the formation of the format is the form	o the PCC 7.3.2.4.1- refers to th 7.3A.0.4-2 refers to th 7.3A.0.4-4 refers to th 2UL CA refers to th ding to tak	bands an 3. The Uplink F 2. The Uplink F 4a. The Uplink F according The Uplink F ole 7.3A.0.0	d PCC N _{Rt} RB allocatio RB allocatio RB allocatio to table 7.3 RB allocatio 6-2.	on for refe on for refe on for refe on for refe BA.0.5-1 fo on for refe	carrie erence erence erence or PC3 erence	r Uplin sensit sensit sensit and t sensit	ik RB alloc ivity excer ivity excer ivity excer able 7.3A. ivity excer	each CA Configuratio cation for reference s otions due to UL harr otions due to receiver otions due to intermo 0.5-1a for PC2. otions due to cross ba antennas connected.	ensitivity nonic interference r harmonic mixing dulation	

Table 7.3A.1_1.4.1-2: Test Configuration Table for intra-band non-contiguous 2DL CA exceptions

						In	itial Conditi	ons							
Tes	st Enviro	onment as s	specified	in TS 38.5	08-1 [5] sub	clause 4.1	NC, 1	L/VL, TL/VH,	TH/VL,	TH/\	/H				
Tes	t Frequ	encies as s	pecified	in TS 38.5	08-1 [5] subo	clause 4.3	.1 For te	For test frequencies refer to "Range" columns.							
Tab con	ole 5.5A nbinatio	ombination .3.1-1 for th n sets supp as specified	ne CA Co ported by	nfiguratior the UE.	pecified in su across ban	ubclause dwidth	Refer	to "PCC N _{RB} "	and "SC	C N	RB " columr	IS			
Net	work sig	gnalling val	ue		Tost	t Paramot	Unles	NS_01 Unless given by Table 7.3.2.3-4 for the band with active uplink of s for CA Configurations							
				A Config	uration / CB			DL Allocati				Allocation (Note 2	2 2)		
ID		CA Conf			PCC	W _{gap} / [MHz]	scc	CC MOD	PCC SCC RB alloca on	>	CC MOD	PCC & SCC allocation	RB		
	F	PCC	S	сс					PCC	scc		(L _{CRB} @ RB _{start})			
	Band	Range	Band	Range						Š					
		1		I	Test S	<u> </u>	r a CA_n71(2A) Configura	tion						
1	n71	CC1	n71	CC2	5MHz	25.0	5MHz	CP-OFDM QPSK	Full R	RB	DFT-s- OFDM QPSK	5@0	-		
2	n71	CC1	n71	CC2	15MHz	10.0	10MHz	CP-OFDM QPSK	Full R	RB	DFT-s- OFDM QPSK	5@2	-		
3	n71	CC1	n71	CC2	15MHz	5.0	10MHz	CP-OFDM QPSK	Full R	RB	DFT-s- OFDM QPSK	20@19	-		
Not Not Not	e 2: e 3: e 4: e 5:	Use CA Co present in t REFSENS_ The Wgap i If the UE su highest NR	nfiguratic he table. CA_1 re is definec ipports m B_PCC is	on – specif Otherwise fers to the d to be wid nultiple CC s tested	ic test points use the Def Uplink RB a lest possible Combination	if present ault Test S Ilocation fo on band b ns in the C	t in the table Settings test or reference based on the CA Configura	points. sensitivity exc PCC and SC	e test po ceptions C config same NF	oints acco jurati RB_a	from matc ording to ta ion agg, only th	hing Group Test Se able 7.3A.0.2.2-1 ne combination with			

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and Reference Measurement Channel is set according to Tables 7.3A.1_1.4.1-1 and 7.3A.1_1.4.1-2.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3A.1_1.4.3.

7.3A.1_1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.

- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.3A.1_1.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Tables 7.3A.1_1.4.1-1 and 7.3A.1_1.4.1-2. on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 6.2A.1.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3A.1_1.5-1 and 7.3A.1_1.5-2 for PC3 CA, and in Table 7.3A.1_1.5-1a for PC2 CA. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the throughput measurement. Allow at least 200ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
- 7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.

7.3A.1_1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED and following exception:

For test points with "REFSENS_CA_3" UL configuration in table 7.3A.1_1.4.1-1, message exception in table 7.3A.1_1.4.3-1 applies.

Derivation Path: TS 38.508-1 [5] Table 4.6.3-62 FrequencyInfoUL-SIB										
Information Element Value/remark Comment Condition										
p-Max	20		Power class 3 and Inter-band 2UL CA							
23 Power class 2 and Inter-band 2UL CA										

Table 7.3A.1_1.4.3-1: FrequencyInfoUL-SIB

7.3A.1_1.5 Test requirement

For inter-band carrier aggregation the throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.2.2 with parameters specified in Table 7.3A.1_1.5-1 for PC3, and in Table 7.3A.1_1.5-1a for PC2. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

Table 7.3A.1_1.5-1: Reference sensitivity requirement for inter band PC3 CA

СА	Test	NR	SCS						Channel	Bandwidt	h					
configuration	ID	band	kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	70 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
CA_n1A-n3A	all	n1	15	-100+23+TT -100 -2.7												
				+23+TT ⁴												
	1	n3	15	-97+TT 97-2.7+TT ⁴												
	2	n3	15							-						
										82.3+1 .4 +TT						
										-82.3-						
										2.7+1. 4+TT ⁴						
CA_n1A-n8A	1	n1	15	-100+6+TT												
				-100 -2.7 +6+TT⁴												
	1	n8	15	-97+TT -97-2.7+TT ⁴												
CA_n1A-n77A	all	n1	15	-97-2.7+11			-93.8 +TT									
			-				-93.8 - 2.7+TT⁴									
	1	n77	30													-85.1 +13.8+TT -85.1 - 2.2+13.8+TT ⁴
	2	n77	15				-92.2 +0.3+TT -92.2 - 2.2+0.3+TT ⁴	-								2.2.110.0111
CA_n1A-n78A	1	n1	15	-100 +8+TT -100 -2.7 +10.7+TT⁴			2.2.0.0111									
	1	n78	15	+10.7+11	-95.8 +TT -95.8 -2.2 +TT ⁴											
CA_n2A-n48A	1	n48	15				-92.7 +0.3+TT -94.9 +0.3+TT ⁴	-								
	2	n2	15	-98.0 +12+TT -100.7 +12+TT ⁴												
CA_n2A-n66A	1	n2	15	-98.0 +20+TT -100.7 +20+TT ⁴												

Release 17

	2	n66	15	-99.5 +4+TT -102.2 +4+TT ⁴							
CA_n2A-n77A	1										-85.1 +13.8+TT
											-87.3 +13.8+TT ⁴
	2					-92.2 +0.3+TT					
						-94.4 +0.3+TT ⁴					
	3					-91.8 +3.7+TT					
						-94.5+ 3.7+TT ⁴					
	4			-98.0 +26+TT -100.7							
				+28.7+TT ⁴							
	5			-98.0 +8+TT -100.7							
				+10.7+TT ⁴							
	6			-98.0 +5+TT -100.7 +5+TT ⁴							

configuration ID band KHz 5MHz (dBm) 10 MHz (dBm) 20 MHz (dBm) 40 MHz (dBm) 60 MHz (dBm) 60 MHz (dBm) 60 MHz (dBm) 70 MHz (dBm) 80 MHz (dBm) 60 MHz (dBm) 70 MHz (dBm) 80 MHz (dBm) 80 MHz (dBm) 70 MHz (dBm) 80 MHz (dBm) 70 MHz (dBm) 80 MHz (dBm) 70 MHz (dBm) 80 MHz (dBm) 70 MHz (dBm) 70 MHz (dBm) 70 MHz (dBm) 70 MHz (dBm)	CA	Test	NR	SCS						Channel	Bandwidt	h					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	configuration	ID			5 MHz (dBm)		MHz		25 MHz	30 MHz (dBm)	40 MHz	50 MHz	MHz	MHz	MHz	MHz	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	CA_n3A-n77A									-88.9							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		A 11	52	15						+TT							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		All	115	15						-00.9 -							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $										+TT ⁴							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $																	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1	n77	30													+TT
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $																	-85.1 -2.2 +13 8 +TT ⁴
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						-95.3											113.0 111
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		2	n77	15		+0.3 +TT											
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		2	1177	15		-95.3 -2.2											
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				45	00.0	+0.3 +TT ⁴											
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					-98.0 +30+11												05.4
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		'	n//	30													-00.1 +13.8+TT
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $																	-87.3
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $																	+13.8+TT ⁴
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		2	n77	15				-92.2									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								+0.3+11									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$																	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		3	n5	15		-94.8											
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						+4.0+TT											
$\begin{array}{c c c c c c c c c c c c c c c c c c c $																	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		5	n5	15	-98.0 +5.5+TT												
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	CA_n70A-n71A																
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$																	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1	n70	15					-92.7 -								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$									2.7								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$									+4.1								
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		2			-100.0 +0.0				+11*								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		2															
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			n70	15	-100.0 -2.7												
n70 15 -100.0 -2.7 +5 +TT ⁴					+9.9 +TT ⁴												
$+TT^4$		3		45	-100.0 +5 +TT												
			n70	15	-100.0 -2.7 +5 +TT ⁴												
		All	n71	15	-97.2 +TT	-94.0 +TT			1								

CA	Test	NR	SCS						Channel	Bandwidtl	h					
configuration	ID	band	kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	70 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
CA_n3A-n78A	1, 2	n3	15				-90.8 +TT -90.8 -2.7 +TT ⁴		-88.9 +TT -88.9 - 2.7+ TT ⁴							
	1	n78	30													-85.6 +13.8 +TT -85.6 -2.2 +13.8 +TT ⁴
	2	n78	15				-92.7 +0.3 +TT -92.7 -2.2 +0.3 +TT ⁴									
	3	n3	15	-97.0 +[26] +TT -97.0 -2.7 +[28.7] +TT ⁴												
	4	n3	15	-97.0 +[8] +TT -97.0 -2.7 +[10.7] +TT ⁴												
	3, 4	n78	15		-95.8 +TT -95.8 -2.2 +TT⁴											

CA	Test	NR	SCS						Channel	Bandwidt	h					
configuration	ID	band	kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	70 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
CA_n5A-n78A																
	1, 2	n5	15				-86.8 +TT									
	1	n78	30													-85.6 +1.4 +TT
	-	1170	30													-85.6 - 2.2 +1.4 +TT4
							-92.7 +7.8 +TT	-								
	2	n78	15				-92.7 -2.2 +7.8 +TT4									
CA_n7A-n78A											-81.5					
											+4.5 +TT					
	1	n7	30								-81.5 - 2.7+4. 5 +TT⁴					
			00													-85.6 +1.4 +TT
	1	n78	30													-85.6 - 2.2 +1.4 +TT ⁴
CA_n8A-n78A	1	n8	15				-85.8 + TT									
	1	n78	30													-85.6 +1.4 +TT -85.6 -2.2 +1.4 +TT ⁴
	2	n8	15	-97.0 + 8.3 +TT												
	2	n78	15		-95.8 +TT -95.8 -2.2 +TT ⁴											
CA_n26A-n66A	1	n26	15	-97.5⁵ + 30 +TT												

1	n66	15	-99.5 +TT													
---	-----	----	-----------	--	--	--	--	--	--	--	--	--	--	--	--	--

	1	n26	15	-97.5⁵ + 30 +TT							
CA_n26A-n70A	1	n70	15				-92.7 + TT -92.7 - 2.7 +TT ⁴				
	1	n29	15	-97.0 + 17.5 + TT							
CA_n29A-n71A	1	n71	15			-86.0 + TT					
0A_1129A-117 TA	2	n29	15		-93.8 + 16.0 +TT						
	2	n71	15			-86.0 + TT					

CA	Test	NR	SCS						Channel	Bandwidt	h					
configuration	ID	band	kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	70 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
CA_n48A-n66A	1	n48	15	-99.0 + TT												
	1	n66	15	-99.5 + 5.0 + TT -99.5 +5.0 -2.7 +TT												
	2	n48	15		-95.8 + 23.9 + TT											
	2	n66	15	-99.5 +TT -99.5 -2.7 +TT												
	3	n48	30									-96.1 + 8.3 +TT				
	3	n66	15	-99.5 +TT -99.5 -2.7 +TT												
	4	n48	15		-95.8 + 1.1. + TT											
	4	n66	15	-99.5 +TT -99.5 -2.7 +TT												

CA	Test	NR	SCS						Channel	Bandwidt	h					
configuration	ID	band	kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	70 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
CA_n48A-n70A	1	n48	15		-95.8 + TT											
	1	n70	15					-92.7 +26 +TT								
								-92.7 - 2.7 +28.4 +TT ⁴								
CA_n66A-n71A	1	n66	15	-99.5 +5 +TT -99.5 -2.7 +5 +TT ⁴				<u> </u>								
	1	n71	15	-97.2 +TT												
Note 2: The Note 3: TT fo Note 4: Appli	referenco or each fi cable or	e measur requency ily if oper	ement cl and cha ation wit	maximum output p hannel is specifiec nnel bandwidth is h 4 antenna ports when carrier char	I in Annexe A specified in T is supported	2.2. Config Fable 7.3.2 in the ban	gurations of PDS 2.5-3. d with carrier age	pregation o			irement ar	e specified	l in Annex	C.2.		

CA	Tes	NR	SC					(hannel	Bandwid	th					
configura	tio t ID	ban	S	5 MHz	10 MHz	15	20 MHz	25	30	40	50	60	70	80	90	100 MHz
n		d	kHz	(dBm)	(dBm)	MHz	(dBm)	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	(dBm)
						(dBm		(dBm	(dBm	(dBm	(dBm	(dBm	(dBm	(dBm	(dBm	
)))))))))	
CA_n1A	- 1	n1	15	-100												
n78A				+[17.8]+TT												
				-100 -2.7												
				+[17.8]+TT ⁴												
	1	n78	15		-95.8											
					+TT											
					-95.8 -											
					2.2 +TT ⁴											
Note 1:	The trans	mitter sh	all be se	t to maximum ou	Itput power	level (Tal	ble 7.3A.3.5-2)									
				nt channel is spe					SCH and	PDCCH	before					
				d in Annex C.2.			0									
				channel bandwi	dth is specif	ied in Ta	ble 7.3.2.5-3.									
				with 4 antenna				carrier ad	areaation	confiaur	ed.					

CA	Tes	NR	SC					C	hannel	Bandwid	th					
configuratio n	t ID	ban d	S kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	70 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
CA_n71(2A)	1	n71	15	-97.2 +TT for PCC -97.2 + 4.0 +TT for SCC												
	2	n71	15		-94.0 +22.2 +TT	-91.6 +TT										
	3	n71	15		-94.0 +5.2 +TT	-91.6 +TT										
Note 2: The	referen	ce meas	sureme	t to maximum ou nt channel is spe channel bandwie	cified in An	nexe A2.	2. Configuration	ns of PDS	SCH and	PDCCH	before me	easureme	ent are sp	ecified in	Annex C	.2.

Table 7.3A.1_1.5-2: Reference sensitivity requirement for intraband non-contiguous CA

7.3A.2 Reference sensitivity power level for 3DL CA

7.3A.2.1 Test purpose

To verify the ability of UE that support CA to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3A.2.2 Test applicability

This test case applies to all types of NR UE release 16 and forward that support NR 3DL CA.

7.3A.2.3 Minimum requirements

The minimum conformance requirements are defined in clause 7.3A.0.

- 7.3A.2.4 Test description
- 7.3A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.2A.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3A.2.4.1-1: Test Configuration Table for 3DL CA

								Initial	conditions									
Tes	st Environm	nent as spe	cified in TS	\$ 38.508-1	[5] subclau	use 4.1			Normal, TL	_/VL, TL/VH,	TH/VL, TH/	VH						
Tes	st Frequence	cies as spe	cified in TS	38.508-1	[5] subclau	ise 4.3.1			For test fre	quencies re	fer to "Range	e" columns						
									For Inter-b CA_nXA-n CA_nXC -n nXC and n CA configu CA_n1-n77 CA_n3-n77 CA_n3-n78 CA_n8-nX	and CA: YA-nZA: Mic YA, CA_nY/ XB, mid rang rations cont 7: Mid in ban 7: TBD in ba 3: Mid in ban : Low range	d range for F	PCC and SO nYA-nXB a or PCC and llowing bar w in band 1 D in band 7 Band 8	CC with exc nd CA_nXE I SCC with nd combinat n77 77.	exceptions :	e 11): Inge, High Ra	inge for		
CA	Configurat	tion across	bandwidth	combinati		lause Table		-1 for the		IRB_PCC"and "	'Nrb_scc" со	lumns						
		specified in		5-1					Lowest									
Net	twork signa	alling value							NS_01									
									Unless given by Table 7.3.2.3-4 for the band with active uplink carrier s for CA Configurations									
	1						Test Pa	arameters	tor CA Conf	igurations				111 - 11-		FO 0 (a		
					CA Conf	iguration /	channel	BW				DL A	llocation	UL allo	cation (NOT NOTE 5)	E2.0 to		
I D					iguration				PCC	SCC1	SCC2	CC Mod	PCC & SCC RE allocatio	- Mod	PCC & S alloca			
			W _{gap1}		C1	Wgap2		C2				mou	PC S	;	anoca			
	Band	Range	3-4	Band	Range		Band	Range		lan (hatas l			CC					
					Defa	uit Test Se	ttings for	a CA_NXL	Configurat	ion (Intra-b	and contigu				1			
1	nX	Low CC1	N/A	nX	Low CC2	N/A	nX	Low CC3	Highest N _{RB_agg}	Highest N _{RB_agg}	Highest N _{RB_agg}	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSEN S	-		
2	nX	High CC1	N/A	nX	High CC2	N/A	nX	High CC3	Highest N _{RB_agg}	Highest N _{RB_agg}	Highest N _{RB_agg}	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSEN S	-		

							Test Pa	rameters	for CA Conf	igurations								
					CA Conf	iguration /	channel l	BW		-		DL A	llocatio	on	UL allocation (NOTE2.0 to NOTE 5)			
I D				CA conf	iguration				PCC	SCC1	SCC2	CC	SCC	C & C RB ation	СС	PCC & S		
	P	CC	W	SC	C1	Wgap2	SC	C2				Mod	PC	SC	Mod	allocati	lion	
	Band	Range	W _{gap1}	Band	Range	•••	Band	Range					С	С				
		-	-	-	Defa	ault Test S	ettings fo	<u>r a CA_</u> nX	A-nYA-nZA	Configurat	ion (Inter-ba							
1	nX	default	N/A	nY	default	N/A	nZ	default	Highest	Highest	Highest	CP- OFDM QPSK	Full	RB	DFT-s- OFDM QPSK	REFSEN S	-	
2	nY	default	N/A	nZ	default	N/A	nX	default	Highest	Highest	Highest	CP- OFDM QPSK	Full	RB	DFT-s- OFDM QPSK	REFSEN S	-	
3	nZ	default	N/A	nY	default	N/A	nX	default	Highest	Highest	Highest	CP- OFDM QPSK	Full	RB	DFT-s- OFDM QPSK	REFSEN S	-	
		Default	Test Settir	ngs for a C	A_nXC-nY	′A, CA_nY	A-nXC, C	A_nYA-nX	B and CA_r	XB-nYA Co	onfiguration	s (Intra-ba	and con	tiguou	s + Inter-b	and)		
1	nX	default	N/A	nX	default	N/A	nY	default	Highest N _{RB_agg}	Highest N _{RB_agg}	Highest	CP- OFDM QPSK	Full	RB	DFT-s- OFDM QPSK	REFSEN S	-	
2	nY	default	N/A	nX	default	N/A	nX	default	Highest	Highest N _{RB_agg}	Highest N _{RB_agg}	CP- OFDM QPSK	Full	RB	DFT-s- OFDM QPSK	REFSEN S	-	

					CA Conf	iguration /			for CA Conf	gurations		DL A	llocatio	on	UL allo	cation (NOTI NOTE 5)	E2.0 to	
I D				CA conf	iguration				PCC	SCC1	SCC2	CC	PCC & SCC RB allocation		CC	PCC & SCC RB		
		CC	W _{gap1}		C1	Wgap2		C2				Mod	PC	SC	Mod	allocat	llocation	
	Band	Range	• gap i	Band	Range	•••	Band	Range					C C					
								1	figuration (ion-contigu	ous + Inte	r-band		-	1		
1	nX	CC1	Max (NOTE 7)	nX	CC2	N/A	nY	Mid	Highest N _{RB_agg} (NOTE 6)	Highest N _{RB_agg} (NOTE 6)	Highest	CP- OFDM QPSK	Full	RB	DFT-s- OFDM QPSK	REFSEN S	-	
2	nY	Mid	NA	nX	CC1	Max (NOTE 7)	nX	CC2	Highest	Highest Nrв_agg	Highest Nrв_agg	CP- OFDM QPSK	Full	RB	DFT-s- OFDM QPSK	REFSEN S	-	
Note Note Note Note Note Note	2.0: RE 2: Use 2: Use 3: Inte 4: Intr 5: Intr 6: If th 7: The	FSENS ref e CA Confi fault Test S er-band: nX ra-band cor ra-band noi ne UE supp e Wgap is do band com	ers to the s guration – s Gettings test (,nY,nZ corn ntiguous + I n-contiguou ports multiple efined to be	ingle carri specific tes points. respond to nter-band: s + Inter-b e CC Com widest po	er Uplink R at points if p the differe nX, nY col pand: nX an abinations i psible on b	B allocation present in the nt bands in rrespond to ad nY correst n the CA C and based	the CA Co the CA Co the differe spond to the onfiguration	once sensiti therwise us onfiguration ent bands in ne different on with the C and SCC	n. E.g. for CA n the CA Cor bands in the same NRB_ag C configuratio	g to table 7. from match n1A-n3A-r figuration, e CA Configu g, only the con for Intra-b	3.2.4.1-3. ing Group T n8A, nX=n1, e.g. for CA_r uration. E.g. pombination v and non-col	nY=n3, nZ n1C-n3A, n for CA_n1, vith the hig ntiguous	z=n8. X=n1, r A-n1A-r hest N⊧	iY=n3 i8A, nX в_рсс із	=n1, nY =r s tested	Dtherwise use n8. c band shall b		
Note	9: The			n CA_nXA	-nYA for 30	CA configur	ations CA	_nXC-nYA,	CA_nYA-nX	C, CA_nYA	-nXB and C	۹_nXB-nY	A does I	not nee	d to be tes	ted even if th	e test	
	:10: In a	hond who		orte /Pv	the test new	ade to ha n	orformed o	only with 4F	Rx antennas	connected								

Table 7.3A.2.4.1-2: Void

Table 7.3A.2.4.1-3: Void

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and Reference Measurement Channel is set according to Tables 7.3A.2.1.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3A.2.1.4.3.

7.3A.2.4.2 Test procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.3A.2.1.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1-1 for C_RNTI to transmit the DL RMC according to Tables 7.3A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.3A.2.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level to the appropriate REFSENS value defined in Tables 7.3.2.5-1 and 7.3.2.5-2 as appropriate. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the throughput measurement. Allow at least 200ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
- 7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.

7.3A.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.3A.2.5 Test requirement

For 3DL carrier aggregation, test parameters are specified in table 7.3A.2.4.1-1. For the CA configurations listed in table 7.3A.2.5-1, the throughput of each component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with reference power level specified in table 7.3.2.5-1 for each non-SDL carrier for 2 Rx antenna port, in table 7.3.2.5-2 for each non-SDL carrier for 4 Rx antenna port and in table 7.3A.1.5-2 for SDL carrier with following additional requirements:

The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

For the UE which supports inter-band carrier aggregation, the test requirement for reference sensitivity shall be increased by the amount given by $\Delta R_{IB,c}$ defined in clause 7.3A.0.3.2 for the applicable operating bands. Unless otherwise stated, $\Delta R_{IB,c}$ is set to zero.

For intra-band non-contiguous CA with one uplink carrier and two or more downlink sub-blocks, the test requirement for SCC(s) shall be increased by ΔR_{IBNC} given in Table 7.3A.0.2.2-1. Unless given by Table 7.3.2.3-4, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.3.1-1) configured.

Carrier aggregation type	DL CA configuration	UL CA configuration
Intro band contiguous 2DL CA	CA_n77D	-
Intra-band contiguous 3DL CA	CA_n78D	-
Intra-band non-contiguous 3DL CA	CA_n48(3A)	-
	CA_n1A-n78C	
	CA_n1A-n78(2A)	-
	CA_n1A-n78A-n79A	-
	CA_n26A-n66-n70A	
	CA_n26A-n66(2A)	
	CA_n48A-n66(2A)	
	CA_n48A-n71(2A)	
	CA_n48B-n66A	
	CA_n48B-n70A	
	CA_n48B-n71A	
	CA_n48(2A)-n66A	
Inter-band 3DL CA	CA_n48(2A)-n70A	
	CA_n48(2A)-n71A	
	CA_n48A-n66A-n70A	
	CA_n48A-n66A-n71A	
	CA_n48A-n70A-n71A	
	CA_n66A-n70A-n71A	-
	CA_n66A-n71(2A)	
	CA_n66(2A)-n70A	-
	CA_n66(2A)-n71A	-
	CA_n66B-n70A	-
Γ	CA_n66B-n71A	-
Γ	CA_n70A-n71A(2A)	
	CA_n29A-n66A-n70A	-
SDL configuration	CA_n29A-n66B	-
	CA_n29A-n66(2A)	-

Table 7.3A.2.5-1: Reference sensitivity requirement for 3DL CA

7.3A.3 Reference sensitivity power level for 4DL CA

NOTE: Intraband contiguous and 4 band inter-band 4DL CA are FFS

7.3A.3.1 Test purpose

To verify the ability of UE that support CA to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3A.3.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support NR 4DL CA.

7.3A.3.3 Minimum requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.3.4 Test description

7.3A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

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Table 7.3A.3.4.1-1: Test Configuration Table for 4DL CA

									Initial	conditions											
				[5] subclau								Normal, TL/									
enc	ies as spe	cified in TS	38.508-1	[5] subclau	ise 4.3.1							For test frequencies refer to "Range" columns.									
												For Inter-band CA:									
												CA_nX(2A)-nYA-nZA: Mid range for PCC and SCC with exceptions.									
												CA_nXC-nYA-nZA and CA_nXB-nYA-nZA : Low range, High Range for nXC and nX range for nYA for PCC and SCC with exceptions.									
												Exceptions	for CA confi	gurations of	ontaining th	ha falla	wing har	ad combine	atione		
	mbination setting (CBW) as specified in subclause Table 5.5A.3.1-1 for the CA Configuration across bandwidth												Exceptions for CA configurations containing the following band combinations: CA_n1-n77: Mid in band n1 and Low in band n77								
													CA_n3-n77 : TBD in band 3 and TBD in band 77.								
													CA_n3-n78: Mid in band 3 and High in band 78.								
													CA_n8-nX: Low range for PCC in Band 8								
													CA_n70-n71: High range for PCC in band 71								
om													Refer to "PCC N _{RB} "and "SCC N _{RB} " columns								
		ted by the l						-													
as s	pecified in	Table 5.3.	5-1									Lowest									
gna	lling value											NS_01									
	-											Unless give	n by Table 7	'.3.2.3-4 for	the band	with act	ive uplir	nk carrier			
									arameters f	or CA Conf	igurations										
							uration / ch	annel BW								llocatio			ocation (NOT		
				C	A configu	ration					PCC	SCC1	SCC2	SCC3	CC		С&	CC	PCC & SC		
															Mod		RB	Mod	allocati		
			-			-											ation				
PO	-	Wgap1		C1	Wgap2		C2	Wgap3		CC3						PC	SC				
þ	Range		Band	Range		Band	Range		Band	Range						С	С				
							_					ons (Intra-ba				•			·		
	default	N/A	nX	default	N/A	nY	default	N/A	nZ	default	Highest	Highest	Highest	Highest	CP-	Ful	I RB	DFT-s-	REFSEN		
											NRB_ag	NRB_ag			OFDM			OFDM	S		
											g	g			QPSK			QPSK			
	default	N/A	nX	default	N/A	nX	default	N/A	nZ	default	Highest	Highest	Highest	Highest	CP-	Ful	I RB	DFT-s-	REFSEN		
												NRB_ag	NRB_ag		OFDM			OFDM	S		
												g	g		QPSK			QPSK			
Í	default	N/A	nX	default	N/A	nX	default	N/A	nY	default	Highest	Highest	Highest	Highest	CP-	Full	I RB	DFT-s-	REFSEN		
												NRB_ag	NRB_ag		OFDM			OFDM	S		
1												g	g		QPSK			QPSK			

					Test P	Parameters for CA Config	gurations								
			CA		DL A	UL allo	ocation (NOT								
		C	CA configura	ration			PCC	SCC1	SCC2	SCC3	CC	PC	C &	CC	PCC & SC
						I	1			1	Mod	SCC	C RB	Mod	allocati
						I	」			1	1	alloc	cation	'	1 7
PCC	Wgap1	SCC1	Wgap2	SCC2	Wgap3	SCC3	′			1	1	PC	SC	1	1 7
d Range		Band Range	F	Band Range	F	Band Range	<u> </u>			<u> </u>		С	С	<u> </u>	1

				Default	Test Setti	ngs for a C	CA_nX(2A)-r	nYA-nZA Co	onfiguration	n (Intra-band	I non-contig	guous + Inte	er-band)				
CC1	Max (NOTE 7)	nX	CC2	N/A	nY	N/A	N/A	nZ	default	Highest NRB_ag g (NOTE 6)	Highest NRB_ag g (NOTE 6)	Highest	Highest	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSEN S
default	N/A	nX	CC1	Max (NOTE 7)	nX	CC2	N/A	nZ	default	Highest	Highest NRB_ag g	Highest NRB_ag g	Highest	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSEN S
default	N/A	nX	CC1	Max (NOTE 7)	nX	CC2	N/A	Ny	default	Highest	Highest NRB_ag g	Highest NRB_ag g	Highest	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSEN S
			[Default Tes	t Settings f	or a CA_n>	X(2A)-nY(2A) Configurat	ion (Intra-ba	nd non-conti	guous + Intr	a-band non-	contiguous)			
CC1	Max (NOTE 7)	nX	CC2	N/A	nY	CC1	Max (NOTE 7)	nY	CC2	Highest NRB_ag g (NOTE 6)	Highest NRB_ag g (NOTE 6)	Highest NRB_ag g (NOTE 6)	Highest NRB_a gg (NOTE 6)	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSEN S
CC1	Max (NOTE 7)	nY	CC2	N/A	nX	CC1	Max (NOTE 7)	nX	CC2	Highest NRB_ag g (NOTE 6)	Highest NRB_ag g (NOTE 6)	Highest NRB_ag g (NOTE 6)	Highest NRB_a gg (NOTE 6)	CP- OFDM QPSK	Full RB	DFT-s- OFDM QPSK	REFSEN S

CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

REFSENS refers to the single carrier Uplink RB allocation for reference sensitivity according to table 7.3.2.4.1-3.

Use CA Configuration – specific test points if present in the table, otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.

Inter-band: X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n3A-n8A, X=1, Y=3, Z=8.

Intra-band contiguous + Inter-band: X,Y,Z correspond to the different bands in the CA Configuration, e.g. for CA_n1C-n3A-n8A, X=1,Y=3, Z = 8

Intra-band non-contiguous + Inter-band: X, Y and Z correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n1A-n8A-n28A, X=1, Y =8, Z = 28.

If the UE supports multiple CC Combinations in the CA Configuration with the same NRB_agg, only the combination with the highest NRB_PCC is tested

The Wgap is defined to be widest possible on band based on the PCC and SCC configuration for Intra-band non-contiguous

For band combinations including operating bands without uplink band (as noted in Table 5.2-1), only the CA configurations where PCC band has uplink band shall be tested

The fallback configurations including CA_XA-YA for 4CA configurations XC-YA-ZA and XB-YA-ZA do not need to be tested even if the test frequency differs. 7.3A.1_1 shall be tested for all XA-YA combinations including exceptions.

In a band where UE supports 4Rx, the test needs to be performed only with 4Rx antennas connected.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.

4. The UL and Reference Measurement Channel is set according to Table 7.3A.3.4.1-1.

- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3A.2.1.4.3.

7.3A.3.4.2 Test procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.3A.3.1.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1-1 for C_RNTI to transmit the DL RMC according to Table 7.3A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.3A.3.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level to the appropriate REFSENS value defined in Tables 7.3.2.5-1 and 7.3.2.5-2 as appropriate. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the throughput measurement. Allow at least 200ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
- 7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.

7.3A.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.3A.3.5 Test requirement

For 4DL carrier aggregation, test parameters are specified in table 7.3A.3.4.1-1. For the CA configurations listed in table 7.3A.3.5-1, the throughput of each component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with reference sensitivity power level specified in table 7.3.2.5-1 for each non-SDL carrier for 2 Rx antenna port, in table 7.3.2.5-2 for each non-SDL carrier for 4 Rx antenna port and in table 7.3A.1.5-2 for SDL carrier with following additional requirements:

For the UE which supports inter-band carrier aggregation, the test requirement for reference sensitivity shall be increased by the amount given by $\Delta R_{IB,c}$ defined in clause 7.3A.0.3.2 for the applicable operating bands. Unless otherwise stated, $\Delta R_{IB,c}$ is set to zero.

For intra-band non-contiguous CA with one uplink carrier and two or more downlink sub-blocks, the test requirement for SCC(s) shall be increased by ΔR_{IBNC} given in Table 7.3A.0.2.2-1. Unless given by Table 7.3.2.3-4, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.3.1-1) configured.

Carrier aggregation type	DL CA configuration	UL CA configuration
Inter-band 4DL CA	CA_n26A-n66(2A)-n70A	-
	CA_n48A-n66A-n71(2A)	-
	CA_n48A-n66(2A)-n70A	-
	CA_n48A-n66(2A)-n71A	-
	CA_n48A-n70A-n71(2A)	-
	CA_n48B-n66A-n70A	-
	CA_n48B-n66A-n71A	-
	CA_n48B-n70A-n71A	-
	CA_n48(2A)-n66A-n70A	-
	CA_n48(2A)-n66A-n71A	-
	CA_n48(2A)-n66(2A)	-
	CA_n48(2A)-n70A-n71A	-
	CA_n48(2A)-n71(2A)	-
	CA_n66A-n70A-n71(2A)	-
	CA_n66B-n70A-n71A	-
	CA_n66(2A)-n70A-n71A	-
	CA_n66(2A)-n71(2A)	-
SDL configuration	CA_n29A-n66B-n70A	-
	CA_n29A-n66(2A)-n70	-

Table 7.3A.3.5-1: Reference sensitivity requirement for 4DL CA

7.3A.4 Reference sensitivity power level for 5DL CA

FFS

7.3B Reference sensitivity for NR-DC

For inter-band NR-DC configurations, the reference sensitivity for the corresponding inter-band CA configuration as specified in clause 7.3A applies.

Note: For NR-DC testing, replace CA by NR-DC, PCC by PCell, and SCC by PSCell in clause 7.3A.

7.3C Reference sensitivity for SUL

7.3C.0 Minimum conformance requirements

7.3C.0.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

7.3C.0.2 Minimum conformance requirements for Reference sensitivity power level

For SUL operation, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in Table 7.3.2.3-1 and 7.3.2.3-2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-1 or Supplementary uplink transmission bandwidth less

For SUL operation with downlink CA, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in clause 7.3A.2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.2-1 with reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1), unless sensitivity degradation is allowed in this clause of this specification. These exceptions also apply to any higher order CA or DC combination containing one of the exception combinations in this clause as subset.

DL band	UL band	SCS of UL band (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	70 MHZ	80 MHz	90 MHz	100 MHz
n41	n83	15		100	100	100		100	100	100	100		100	100	100
1141	1103	30		50	50	50		50	50	50	50		50	50	50
n78	n80	15	25	50	75	100			100	100					
n78	n81	15	25	50	75	100			100	100					
n78	n82	15	25	50	75	100			100	100					
n78	n83	15	25	50	75	100			100	100					
n78	n84	15	25	50	75	100	100	100	100	100		100			
n78	n86	15	25	50	75	100			100	100					
n79	n80	15	25	50	75	100			100	100					
n79	n81	15	25	50	75	100			100	100					
n70	n83	15							100	100	100		100		100
n79	1103	30							50	50	50		50		50

Table 7.3C.0.2-1: Supplementary uplink configuration for reference sensitivity

For the UE that supports any of the SUL operation given in Table 7.3C.0.2-2, exceptions to the requirements specified in Table7.3.2.3-1 are allowed when the uplink is active in a lower frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band as noted in Table 7.3C.0.2-2. For these exceptions, the UE shall meet the requirements specified in Table 7.3C.0.2-2 and Supplementary Uplink configuration (exceptions due to harmonic issue given in Table 7.3C.0.2-3.

			N	R Band	/ Chanr	nel band	width o	f the hig	h band				
UL	DL	5	10	15	20	25	30	40	50	60	80	90	100
band	band	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
		dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
n80	n78 ^{1,2}		23.9	22.1	20.9			17.9	16.8	16.0	14.8	14.3	13.8
	n78 ³		1.1	0.8	0.3			0	0	0	0	0	0
n82	n78 ^{4,5}		10.8	9.1	8			6	4.0	3.2	2.0	1.5	1.0
n81	n78 ^{4,5}		10.8	9.1	8			5.1	4.2	3.5	2.3	1.5	1.4
n83	n78 ^{6,7}		10.4	8.9	7.8			4.7	3.7	3	1.7	1.2	0.7
n86	n78 ^{1,2}		23.9	22.1	20.9			17.9	16.8	16.0	14.8	14.3	13.8
1100	n78 ³		1.1	0.8	0.3				0	0	0	0	0
n81 NOTE 1	n79 ^{6,7}				n there is			[6.8]	6.2	[5.6]	4.9		4.4
NOTE 3	freque band. 3: The re freque $F_{UL_{low}}^{LB}$ bandw 4: These r bandw transm	$f_{LL}^{LB} = \left[f_{DL}^{H} \right]$ ncy in th quireme ncy at $\frac{1}{2}$ $+ BW_{Ch}^{LL}$ idths con- equirem- idth of th ission b	B / 0.2 0.2 $0.1e victimnts are c(20 + BV)B_{unnel} / 2 \lenfiguredents appne aggreandwidth$	1 in MHz (higher) only appl $V_{Channel}^{HB} / 2$ $f_{UL}^{LB} \leq F_{U}$ in the ag ly when ssor (low of a vic	and F_{UL}^{LL} band in l icable to 2^{D} MHz c $T_{UL-high}^{LB} - 1$ ggressor there is a ver) band tim (high	^B -low + BV MHz and channel offset from BW ^{LB} (lower) a at least o d for which er) banc	$W_{Channel}^{LB}$ / $Z_{Channel}^{LB}$ bandwid bandwid m $2f_{UL}^{LB}$ / 2 , where and victin bone indiviction the 4t	$2 \leq f_{UL}^{LB} \leq f_{UL}^{LB} \leq e^{it}$ the ch dths no latin the vident of the second secon	$\leq F_{UL_high}^{LB}$ annel ba arger tha ctim (high mel and B r) bands within the itter harm	$-BW_{Cha}^{LB}$ andwidth an 20 MH her banc $W_{Channel g}^{HB}$ in MHz, he uplink monic is	nnel / 2 w configur Hz and w l) with are the cl respecti transmi within th	rith f_{DL}^{HB} red in the rith a car nannel vely. ssion re downli	carrier lower rier nk
NOTE	freque	$_{LL}^{LB} = \left[f_{DL}^{H} \right]$	$\frac{1}{2}/0.4$	1 in MHz	rified for z and F_{UI}^{L} band in l	$B_{L_{low}}^{B} + B$	W ^{LB} _{Channel} /	$2 \le f_{UL}^{LB}$	$\leq F_{UL_high}^{LB}$	$_{h}-BW_{C}^{L}$	$\frac{B}{annel}$ / 2 V	with $f_{\it DL}^{\it HB}$	carrie
	bandw transm	idth of th	ne aggre andwidth	ssor (low of a vic	n there is ver) band tim (high	d for which er) banc	ch the 5t I.	h transm	litter harı	monic is	within th	e downl	
NULE	7: The re				MHz an								

Table 7.3C.0.2-2: Reference sensitivity for SUL operation (exceptions due to harmonic issue)

				NR Ban	d / Chann	el bandw	vidth of t	he high b	and				
UL band	DL band	5 MHz (Nrв)	10 МНz (N _{RB})	15 MHz (N _{RB})	20 МНz (Nrв)	25 MHz (N _{RB})	30 МНz (N _{RB})	40 МНz (N _{RB})	50 МНz (N _{RB})	60 МНz (N _{RB})	80 MHz (N _{RB})	90 МНz (N _{RB})	100 МНz (N _{RB})
n80	n78		25	36	50			50	50	50	50	50	50
n81	n78		16	25	25			25	25	25	25	25	25
n81	n79							25	25	25	25		25
n82	n78		16	20	20			20	20	20	20	20	20
n83	n78		10	15	20			25	25	25	25	25	25
n86	n78		25	36	50			100	100	100	100	100	100
NOTE 1:	15kHz S	CS is assu	imed for L	JL band.									
NOTE 2:	The UL o	configuratio	on applies	regardles	s of the cl	hannel ba	ndwidth a	of the low	band unl	ess the U	L resourc	e blocks	exceed
	that spec	cified in Ta	ble 7.3.2.	3-3 for the	uplink ba	ndwidth ii	n which c	ase the a	llocation a	according	to Table	7.3.2.3-3	applies.
NOTE 3:	Unless s	tated other	rwise, UL	resource l	blocks sha	all be cent	tred withir	h the trans	smission	bandwidtl	n configur	ation for t	the

7.3C.0.3 ARIB,c for SUL

7.3C.0.3.1 General

channel bandwidth.

For a UE supporting a SUL configuration, the $\Delta R_{IB,c}$ applies for both SC and SUL operation.

7.3C.0.3.2 SUL band combination

For the UE which supports SUL band combination, the minimum requirement for reference sensitivity in subclause 7.3C.0 shall be increased by the amount given in $\Delta R_{IB,c}$ defined in subclause 7.3C.0.3 for the applicable operating bands. Unless otherwise stated, $\Delta R_{IB,c}$ is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is ≤ 1 GHz, the applicable additional ΔR_{IB,c} shall be the average value for all band combinations defined in subclause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.521-3 [14], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum ΔR_{IB,c} among the different supported band combinations involving such band shall be applied
- When the operating band frequency range is > 1 GHz, the applicable additional $\Delta R_{IB,c}$ shall be the maximum value for all band combinations defined in subclause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.521-3 [14] for the applicable operating bands.

7.3C.0.3.2.1 \triangle RIB,c for two bands

Band combination for SUL	NR Band	ΔR _{IB,c} [dB]
SUL_n78-n80	n78	0.5
SUL_n78-n81	n78	0.5
SUL_n78-n82	n78	0.5
SUL_n78-n83	n78	0.5
SUL_n78-n84	n78	0.5
SUL_n78-n86	n78	0.5
SUL_n79-n83	n79	0.5

7.3C.0.3.2.2

∆RIB,c for three bands

Table 7.3C.0.3.2.2-1: ΔR_{IB,c} due to SUL (three bands)

Band combination for SUL	NR Band	ΔR _{IB,c} (dB)
CA n1 SUL n78-n80	n1	0.2
CA_III_30L_II78-180	n78	0.5
CA n1 SUL n78-n84	n1	0.2
CA_II1_30L_II78-1184	n78	0.5
CA_n3_SUL_n78-n80	n3	0.2
CA_113_30L_1178-1180	n78	0.5
CA_n28_SUL_n41-n83	n28	0.2
CA_n28_SUL_n79-n83	n28	0.2
CA_1120_30L_11/9-1183	n79	0.5

The normative reference for this requirement is TS 38.101-1 [2] clause 7.3C.2 and 7.3C.3.

7.3C.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

7.3C.2 Reference sensitivity power level for SUL

Editor's Note: The following aspects are either missing or not yet determined:

- Exceptional test points for configurations except SUL_n78-n80 is FFS

7.3C.2.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under SUL operation and conditions of low signal level, ideal propagation and no added noise.

7.3C.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports SUL operation on the SUL bands.

7.3C.2.3 Minimum conformance requirement

The minimum conformance requirements are defined in clause 7.3C.0.

- 7.3C.2.4 Test description
- 7.3C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3C.2.4.1-1 and 7.3C.2.4.1-2. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

				Initial Con	ditions					
Test Envir	onment as spe	cified in TS 38.508			L/VL, TL/VH, TH/VL, TH/VH					
[5] subcla	use 4.1									
Test Freq	uencies as spe	cified in TS 38.508	3-1	Mid range for SUL carrier.						
[5] subcla	use 4.3.1			Low, Mid,	High range for non-SUL carr	ier				
					wing exceptions:					
				SUL_n78-n80: High in band n78						
Test Char	nel Bandwidth	s as specified in T	S	Lowest, Mid, Highest for Non-SUL carrier						
38.508-1	5] subclause 4	.3.1		For SUL band:						
				n80: 30 M	Hz					
				n81: 20 M						
				n82: 20 M						
				n83: 20 MHz						
				n84: 20 M						
				n86: 40 M						
				n95: 15 M						
Test SCS	as specified in	Table 5.5C-1		15kHz for SUL carrier						
				Lowest for Non-SUL carrier						
			1	Test Para						
Test ID		Configuration		UL		figuration				
	Modulation			iguration	Modulation	RB allocation (NOTE 2)				
1	CP-OFDM	Full RB (NOTE		N/A	DFT-s-OFDM QPSK	REFSENS				
	QPSK	1)				(NOTE 2)				
				each SCS and channel BW as specified in Table 7.3.2.4.1-2.						
NOTE 2:				a which def	ines uplink RB configuration	and start RB location for				
NOTE		annel BW and NR								
NOTE 3:			x, the f	test needs t	to be repeated with only 2Rx	antennas connected and				
	the other anter	nnas terminated.								

Table 7.3C.2.4.1-1: Test Configuration Table for SUL without exceptions

Table 7.3C.2.4.1-1a: SUL configuration for reference sensitivity, LCRB @ RBstart format (without exception)

		NR	Band /	SCS of S	UL band /	Channel	bandw	idth of the	DL band	I / Lcrb@F	RB _{Start} of S	SUL band		
DL	SUL	SCS	5	10	15	20	25	30	40	50	60	80	90	100
band	band	of	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
		SUL												
		band												
		(kHz)												
n41	n80	15		160@0	160@0	160@0			160@0	160@0	160@0	160@0	160@0	160@0
n41	n81	15		100@0	100@0	100@0			100@0	100@0	100@0	100@0	100@0	100@0
n41	n83	15		100@0	100@0	100@0		100@0	100@0	100@0	100@0	100@0	100@0	100@0
1141	1105	30		50@0	50@0	50@0		50@0	50@0	50@0	50@0	50@0	50@0	50@0
n41	n95	15		75@0	75@0	75@0		75@0	75@0	75@0	75@0	75@0	75@0	75@0
n77	n80	15		160@0	160@0	160@0			160@0	160@0	160@0	160@0	160@0	160@0
n77	n84	15		100@0	100@0	100@0			100@0	100@0	100@0	100@0	100@0	100@0
n78	n80	15		160@0	160@0	160@0			160@0	160@0	160@0	160@0	160@0	160@0
n78	n81	15		100@0	100@0	100@0			100@0	100@0	100@0	100@0	100@0	100@0
n78	n82	15		100@0	100@0	100@0			100@0	100@0	100@0	100@0	100@0	100@0
n78	n83	15		100@0	100@0	100@0			100@0	100@0	100@0	100@0	100@0	100@0
n78	n84	15		100@0	100@0	100@0			100@0	100@0	100@0	100@0	100@0	100@0
n78	n86	15		216@0	216@0	216@0			216@0	216@0	216@0	216@0	216@0	216@0
n79	n83	15							100@0	100@0	100@0	100@0		100@0
117.9	1105	30							50@0	50@0	50@0	50@0		50@0
n79	n80	15							160@0	160@0	160@0	160@0		160@0
n79	n81	15							100@0	100@0	100@0	100@0		100@0
n79	n84	15							100@0	100@0	100@0	100@0		100@0
n79	n95	15							75@0	75@0	75@0	75@0		75@0

Table 7.3C.2.4.1-2: Test configurations table for SUL operation exceptions due to UL harmonic issue

						Initial Conditi	ons						
	t Environr		specified i	n TS 38.5	508-1 [5]	Normal	, TL/VL, TL/	VH, TH/VL	., TH/VH				
	clause 4.2	-											
	t Frequen		pecified in	n TS 38.5	08-1 [5]	See rar	nge column	for each C	С				
	clause 4.3	-											
			dths as sp	ecified in	TS 38.50)8-1 See CE	3W column f	or each CO)				
	subclause												
Tes	t SCS as	specified	in Table	ier									
							for Non-SU	L carrier					
						Test Paramet	ers						
	Downlink Configuration SUL Configuration												
ID	Band	Rang e	CBW	Mod	RB alloc (NOT E 1)	UL Configurati on	Band	Range	CBW	Mod	RB alloc (NOTE 2)		
					Test s	ettings for SUL	_n78-n80						
1	n78	3560	Highe st	CP- OFD M QPSK	Full RB	N/A	n80	High	10 MHz	DFT-s- OFDM QPSK	REFSE NS_SU L		
2	n78	3530	20 MHz	CP- OFD M QPSK	Full RB	N/A	n80	High	10 MHz	DFT-s- OFDM QPSK	REFSE NS_SU L		
	TE 2: RE	FSENS_	SUL refe	rs to the I		ch SCS and ch allocation for 2-3.					armonic		

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.4 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C0, C.1, C.2, C3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.0 with consideration of supplementary uplink physical channels.
- 4. The UL and DL Reference Measurement Channel shall be set according to Table 7.3C.2.4.1-1 or 7.3C.2.4.1-2.
- 5. The UL Reference Measurement Channel shall be set according to Table 7.3C.2.4.1-1 for REFSENS without exceptions and Table 7.3C.2.4.1-2 when testing is performed with SUL/DL band combination listed in Table 7.3C.0.2-2 for exceptions due to harmonic issue.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3C.2.4.3

7.3C.2.4.2 Test procedure

- 1 SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.3C.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC on SUL band according to Tables 7.3C.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3C.2.5-1 for 2Rx and table 7.3C.2.5-2 for 4Rx. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

- 4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
- 5. For configurations listed in table 7.3C.2.4.1-2, repeat step 1-4 with table 7.3C.2.4.1-2 replacing table 7.3C.2.4.1-1 in step1 and step 2, table 7.3C.2.5.1-1 replacing 7.3C.2.5-1 and table 7.3C.2.5-2 in step 3.

7.3C.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.3.6.1.1.2 ensuring UL/SUL indicator in Table 4.3.6.1.1.2-1 with condition SUL, subclause 4.6 ensuring Tables 4.6.1-28 with condition SUL AND (RF OR RRM), 4.6.3-14 with condition SUL_SUL for SUL carrier, and Table 4.6.3-167 with condition PUSCH_PUCCH_ON_SUL, additionally the following exception shown in Table 7.3C.2.4.3-1 is considered.

Table 7.3C.2.4.3-1: PUSCH-Config

Derivation Path: TS 38.508-1 [5], Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED

7.3C.2.5 Test requirement

The throughput measured in step 4 shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annex A3.2 for REFSENS without exception testing with receive power level specified in Tables 7.3C.2.5-1 for 2Rx antenna port and Tables 7.3C.2.5-2 for 4 Rx antenna port, and parameters specified in table 7.3C.2.4.1-1.

Table 7.3C.2.5-0: Test Tolerance (TT) for RX sensitivity level

f ≤ 3.0GHz	3.0GHz < f ≤ 6.0 GHz
0.7 dB	1.0 dB

				Operati	ng band /	SCS / Ch		dwidth / [Duplex-mo					
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	Duplex Mode
n1	15	-100.0	-96.8	-95.0	-93.8	-92.7	-91.9	-90.6	-89.6	()	(((FDD
		+TT	+TT	+TT	+TT	+TT	+TT	+TT	+TT					
	30		-97.1	-95.1	-94.0	-92.8	-92.0	-90.7	-89.7					
			+TT	+TT	+TT	+TT	+TT	+TT	+TT					
	60		-97.5	-95.4	-94.2	-93.0	-92.1	-90.9	-89.7					
			+TT	+TT	+TT	+TT	+TT	+TT	+TT					
n2	15	-98.0	-94.8	-93.0	-91.8									FDD
		+TT	+TT	+TT	+TT									
	30		-95.1	-93.1	-92.0									
			+TT	+TT	+TT									
	60		-95.5	-93.4	-92.2									
			+TT	+TT	+TT									
n3	15	-97.0	-93.8	-92.0	-90.8	-89.7	-88.9	-87.6						FDD
		+TT	+TT	+TT	+TT	+TT	+TT	+TT						
	30		-94.1	-92.1	-91.0	-89.8	-89.0	-87.7						
			+TT	+TT	+TT	+TT	+TT	+TT						
	60		-94.5	-92.4	-91.2	-90.0	-89.1	-87.9						
			+TT	+TT	+TT	+TT	+TT	+TT						
n5	15	-98.0	-94.8	-93.0	-90.8									FDD
		+TT	+TT	+TT	+TT									
	30		-95.1	-93.1	-91.0									
			+TT	+TT	+TT									
	60													
n7¹	15	-98.0	-94.8	-93.0	-91.8									FDD
		+TT	+TT	+TT	+TT									
	30		-95.1	-93.1	-92.0									
			+TT	+TT	+TT									
	60		-95.5	-93.4	-92.2									
			+TT	+TT	+TT									
n8	15	-97.0	-93.8	-92.0	-90.0									FDD
		+TT	+TT	+TT	+TT									
	30		-94.1	-92.1	-90.2									
			+TT	+TT	+TT									
	60													

Table 7.3C.2.5-1: Reference sensitivity QPSK PREFSENS for 2Rx

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Our event in	000	-	40		ng band /							00	400	Dural
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	Duplex Mode
n12	15	-97.0	-93.8	-84.0	(4211)	((((4211)	(((FDD
	10	+TT	+TT	+TT										
	30		-94.1 +TT	-84.1 +TT										
	60													
n14	15	-97.0 +TT	-93.8 +TT											FDD
	30		-94.1 +TT											
	60													
n20	15	-97.0 +TT	-93.8 +TT	-91.0 +TT	-89.8 +TT									FDD
	30		-94.1 +TT	-91.1 +TT	-90.0 +TT									
	60													
n25	15	-96.5 +TT	-93.3 +TT	-91.5 +TT	-90.3 +TT									FDD
	30		-93.6 +TT	-91.6 +TT	-90.5 +TT									
	60		-94.0 +TT	-91.9 +TT	-90.7 +TT									
n26	15	-97.5 +TT	-94.5 +TT	-92.7 +TT	-87.6 +TT									
	30		-94.8 +TT	-92.7 +TT	-87.7 +TT									
n28	15	-98.5 +TT	-95.5 +TT	-93.5 +TT	-90.8 +TT		-78.5 +TT							FDD
	30		-95.6 +TT	-93.6 +TT	-91.0 +TT		-78.6 +TT							
	60													
n30	15	-99.0 +TT	-95.8 +TT											FDD
	30		-96.1 +TT											
	60													

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Operating	SCS	5	10	15	20	25	30 MHz	40	50	60	80	90	100	Duplex
Band	kHz	MHz	MHz	MHz	MHz	MHz	(dBm)	MHz	MHz	MHz	MHz	MHz	MHz	Mode
Bana		(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(abiii)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	mode
n34	15	-100.0	-96.8	-95.0	(ubiii)			(abiii)	(abiii)	(abiii)	(abiii)	(abiii)	(abiii)	TDD
110-4	10	+TT	+TT	+TT										100
	30		-97.1	-95.1										
	00		+TT	+TT										
	60		-97.5	-95.4										
	00		+TT	+TT										
n38	15	-100.0	-96.8	-95.0	-93.8			-90.6						TDD
1100	10	+TT	+TT	+TT	+TT			+TT						
	30		-97.1	-95.1	-94.0			-90.7						
	00		+TT	+TT	+TT			+TT						
	60		-97.5	-95.4	-94.2			-90.9						
			+TT	+TT	+TT			+TT						
n39	15	-100.0	-96.8	-95.0	-93.8	-92.7	-91.9	-90.6						TDD
		+TT	+TT	+TT	+TT	+TT	+TT	+TT						
	30		-97.1	-95.1	-94.0	-92.8	-92.0	-90.7						
			+TT	+TT	+TT	+TT	+TT	+TT						
	60		-97.5	-95.4	-94.2	-93.0	-92.1	-90.9						
			+TT	+TT	+TT	+TT	+TT	+TT						
n40	15	-100.0	-96.8	-95.0	-93.8	-92.7	-91.9	-90.6	-89.6					TDD
		+TT	+TT	+TT	+TT	+TT	+TT	+TT	+TT					
	30		-97.1	-95.1	-94.0	-92.8	-92.0	-90.7	-89.7	-88.9 +TT	-87.6			
			+TT	+TT	+TT	+TT	+TT	+TT	+TT		+TT			
	60		-97.5	-95.4	-94.2	-93.0	-92.1	-90.9	-89.8	-89.1 +TT	-87.6			
			+TT	+TT	+TT	+TT	+TT	+TT	+TT		+TT			
n41 ¹	15		-94.8	-93.0	-91.8		-89.9	-88.6	-87.6					TDD
			+TT	+TT	+TT		+TT	+TT	+TT					
	30		-95.1	-93.1	-92.0		-90.0	-88.7	-87.7	-86.9 +TT	-85.6	-85.1	-84.7	
			+TT	+TT	+TT		+TT	+TT	+TT		+TT	+TT	+TT	
	60		-95.5	-93.4	-92.2		-90.1	-88.9	-87.8	-87.1 +TT	-85.6	-85.1	-84.7	
			+TT	+TT	+TT		+TT	+TT	+TT		+TT	+TT	+TT	
n48 ¹	15	-99.0	-95.8	-94.0	-92.7			-89.6	-88.65					TDD
		+TT	+TT	+TT	+TT			+TT	+TT					
	30		-96.1	-94.1	-92.9			-89.7	-88.7 ⁵	-87.9 ⁵	-86.6 ⁵	-86.1 ⁵	-85.6 ⁵	
			+TT	+TT	+TT			+TT	+TT	+TT	+TT	+TT	+TT	

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60	-96.5	-94.4	-93.1		-89.9	-88.8 ⁵	-88.05	-86.75	-86.25	-85.7 ⁵	
	+TT	+TT	+TT		+TT	+TT	+TT	+TT	+TT	+TT	
											1

			-		ng band /						-			
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	Duplex Mode
n50	15	-100.0	-96.8	-95.0	-93.8	(abiii)	-91.9	-90.6	-89.6	(abiii)	(abiii)	(abiii)	(abiii)	TDD
1100	10	+TT	+TT	+TT	+TT		+TT	+TT	+TT					100
	30		-97.1	-95.1	-94.0		-92.0	-90.7	-89.7	-88.9 +TT	-87.6			
			+TT	+TT	+TT		+TT	+TT	+TT		+TT			
	60		-97.5	-95.4	-94.2		-92.1	-90.9	-89.8	-89.1 +TT	-87.6			
			+TT	+TT	+TT		+TT	+TT	+TT		+TT			
n51	15	-100.0 +TT												TDD
	30	- T I I												-
	60													
n53	15	-100.0 +TT	-96.8 +TT											TDD
	30		-97.1 +TT											
	60		-97.5 +TT											
n65	15	- 99.5+TT	- 96.3+TT	- 94.5+TT	- 93.3+TT									FDD
	30	33.3+11	-	-	-									
	60		96.6+TT	94.6+TT -	93.5+TT -									-
	00		- 97.0+TT	- 94.9+TT	- 93.7+TT									
n66	15	-99.5 +TT	-96.3 +TT	-94.5 +TT	-93.3 +TT	-92.2 +TT	-91.4 +TT	-90.1 +TT						FDD
	30		-96.6 +TT	-94.6 +TT	-93.5 +TT	-92.3 +TT	-91.5 +TT	-90.2 +TT						
	60		-97.0	-94.9	-93.7	-92.5	-91.6	-90.4						
n70	15	-100.0	+TT -96.8	+TT -95.0	+TT -93.8	+TT -92.7	+TT	+TT						FDD
		+TT	+TT	+TT	+TT	+TT								
	30		-97.1 +TT	-95.1 +TT	-94.0 +TT	-92.8 +TT								
	60		-97.5 +TT	-95.4 +TT	-94.2 +TT	-93.0 +TT								

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				Operati	ing band /	SCS / Ch	annel ban	dwidth / [Duplex-m	ode				
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	Duplex Mode
n71	15	-97.2 +TT	-94.0 +TT	-91.6 +TT	-86.0 +TT									FDD
	30		-94.3 +TT	-91.9 +TT	-87.4 +TT									
	60	-												
n74	15	-99.5 ³ +TT	-96.3 ³ +TT	-94.5 ³ +TT	-93.3 ³ +TT									FDD
	30		-96.6 ³ +TT	-94.6 ³ +TT	-93.5 ³ +TT									
	60		-97.0 ³ +TT	-94.9 ³ +TT	-93.7 ³ +TT									
n77 ^{1,4}	15		-95.3 +TT	-93.5 +TT	-92.2 +TT			-89.1 +TT	-88.1 +TT					TDD
	30		-95.6 +TT	-93.6 +TT	-92.4 +TT			-89.2 +TT	-88.2 +TT	-87.4 +TT	-86.1 +TT	-85.6 +TT	-85.1 +TT	
	60	-	-96.0 +TT	-93.9 +TT	-92.6 +TT			-89.4 +TT	-88.3 +TT	-87.5 +TT	-86.2 +TT	-85.7 +TT	-85.2 +TT	
n78¹	15		-95.8 +TT	-94.0 +TT	-92.7 +TT			-89.6 +TT	-88.6 +TT					TDD
	30		-96.1 +TT	-94.1 +TT	-92.9 +TT			-89.7 +TT	-88.7 +TT	-87.9 +TT	-86.6 +TT	-86.1 +TT	-85.6 +TT	
	60		-96.5 +TT	-94.4 +TT	-93.1 +TT			-89.9 +TT	-88.8 +TT	-88.0 +TT	-86.7 +TT	-86.2 +TT	-85.7 +TT	
n79¹	15							-89.6 +TT	-88.6 +TT					TDD
	30							-89.7 +TT	-88.7 +TT	-87.9 +TT	-86.6 +TT		-85.6 +TT	
	60							-89.9 +TT	-88.8 +TT	-88.0 +TT	-86.7 +TT		-85.7 +TT	

- NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE.
- NOTE 2: The transmitter shall be set to PUMAX as defined in subclause 6.2C.1
- NOTE 3: ³ indicates that the requirement is modified by -0.5 dB when the assigned NR channel bandwidth is confined within 1475.9-1510.9 MHz.
- NOTE 4: The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 3800 MHz.
- NOTE 5: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.
- NOTE 6: TT for each frequency and channel bandwidth is specified in Table 7.3C.2.5-0.

				Оре	rating ba	and / SCS	6 / Channel b	andwidth /	Duplex-m	ode				
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	Duplex Mode
	15	-102.7 +TT	-99.5 +TT	-97.7 +TT	-96.5 +TT	-95.4 +TT	-94.6 +TT	-93.3 +TT	-92.3 +TT					
n1	30		-99.8 +TT	-97.8 +TT	-96.7 +TT	-95.5 +TT	-94.7 +TT	-93.4 +TT	-92.4 +TT					FDD
	60		-100.2 +TT	-98.1 +TT	-96.9 +TT	-95.7 +TT	-94.8 +TT	-93.6 +TT	-92.4 +TT					
	15	-100.7 +TT	-97.5 +TT	-95.7 +TT	-94.5 +TT									
n2	30		-97.8 +TT	-95.8 +TT	-94.7 +TT									FDD
	60		-98.2 +TT	-96.1 +TT	-94.9 +TT									
	15	-99.7 +TT	-96.5 +TT	-94.7 +TT	-93.5 +TT	-92.4 +TT	-91.6 +TT	-90.3 +TT						
n3	30		-96.8 +TT	-94.8 +TT	-93.7 +TT	-92.5 +TT	-91.7 +TT	-90.4 +TT						FDD
	60		-97.2 +TT	-95.1 +TT	-93.9 +TT	-92.7 +TT	-91.8 +TT	-90.6 +TT						
	15	-100.7 +TT	-97.5 +TT	-95.7 +TT	-94.5 +TT									
n7	30		-97.8 +TT	-95.8 +TT	-94.7 +TT									FDD
	60		-98.2 +TT	-97.1 +TT	-94.9 +TT									
	15	-101.7 +TT	-98.5 +TT											
n30	30		-98.8 +TT											FDD
	60													
	15	-102.7 +TT	-99.5 +TT	-97.7 +TT										
n34	30		-99.8 +TT	-97.8 +TT										TDD
	60		-100.2 +TT	-98.1 +TT										

Table 7.3C.2.5-2: Reference sensitivity QPSK PREFSENS for Four Rx antenna ports

				Ope	rating ba	nd / SCS	/ Channel b	andwidth	/ Duplex-m	ode				
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	Duplex Mode
	15	-102.7 +TT	-99.5 +TT	-97.7 +TT	-96.5 +TT			-93.3 +TT						
n38	30		-99.8 +TT	-97.8 +TT	-96.7 +TT			-93.4 +TT						TDD
	60		-100.2 +TT	-98.1 +TT	-96.9 +TT			-93.6 +TT						
	15	-102.7 +TT	-99.5 +TT	-97.7 +TT	-96.5 +TT	-95.4 +TT	-94.6 +TT	-93.3 +TT						
n39	30		-99.8 +TT	-97.8 +TT	-96.7 +TT	-95.5 +TT	-94.7 +TT	-93.4 +TT						TDD
	60		-100.2 +TT	-98.1 +TT	-96.9 +TT	-95.7 +TT	-94.8 +TT	-93.6 +TT						
	15	-102.7 +TT	-99.5 +TT	-97.7 +TT	-96.5 +TT	-95.4 +TT	-94.6 +TT	-93.3 +TT	-92.3 +TT					
n40	30		-99.8 +TT	-97.8 +TT	-96.7 +TT	-95.5 +TT	-94.7 +TT	-93.4 +TT	-92.4 +TT	-91.6 +TT	-90.3 +TT			TDD
	60		-100.2 +TT	-98.1 +TT	-96.9 +TT	-95.7 +TT	-94.8 +TT	-93.6 +TT	-92.5 +TT	-91.8 +TT	-90.3 +TT			
	15		-97.5 +TT	-95.7 +TT	-94.5 +TT		-92.6 +TT	-91.3 +TT	-90.3 +TT					
n41	30		-97.8 +TT	-95.8 +TT	-94.7 +TT		-92.7 +TT	-91.4 +TT	-90.4 +TT	-89.6 +TT	-88.3 +TT	-87.8 +TT	-87.4 +TT	TDD
	60		-98.2 +TT	-96.1 +TT	-94.9 +TT		-92.8 +TT	-91.6 +TT	-90.5 +TT	-89.8 +TT	-88.3 +TT	-87.8 +TT	-87.4 +TT	
	15	-101.2 +TT	-98.0 +TT	-96.2 +TT	-94.9 +TT			-91.8 +TT	-90.8 ³ +TT					
n48	30		-98.3 +TT	-96.3 +TT	-95.1 +TT			-91.9 +TT	-90.9 ³ +TT	-90.1 ³ +TT	-88.8 ³ +TT	-88.3 ³ +TT	-87.8 ³ +TT	TDD
	60		-98.7 +TT	-96.6 +TT	-95.3 +TT			-92.1 +TT	-91.0 ³ +TT	-90.2 ³ +TT	-88.9 ³ +TT	-88.4 ³ +TT	-87.9 ³ +TT	
	15	-102.2 +TT	-99.0 +TT	-97.2 +TT	-96.0 +TT	-94.9 +TT	-94.1 +TT	-92.8 +TT						
n66	30		-99.3 +TT	-97.3 +TT	-96.2 +TT	-95.0 +TT	-94.2 +TT	-92.9 +TT						FDD
	60		-99.7 +TT	-97.6 +TT	-96.4 +TT	-95.2 +TT	-94.3 +TT	-93.1 +TT						

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	Operating band / SCS / Channel bandwidth / Duplex-mode													
Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	30 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)	Duplex Mode
	15	-102.7 +TT	-99.5 +TT	-97.7 +TT	-96.5 +TT	-95.4 +TT								
n70	30		-99.8 +TT	-97.8 +TT	-96.7 +TT	-95.5 +TT								FDD
	60		-100.2 +TT	-98.1 +TT	-96.9 +TT	-95.7 +TT								
	15		-97.5 +TT	-95.7 +TT	-94.4 +TT			-91.3 +TT	-90.3 +TT					
n77 ⁴	30		-97.8 +TT	-95.8 +TT	-94.6 +TT			-91.4 +TT	-90.4 +TT	-89.6 +TT	-88.3 +TT	-87.8 +TT	-87.3 +TT	TDD
	60	-	-98.2 +TT	-96.1 +TT	-94.8 +TT			-91.6 +TT	-90.5 +TT	-89.7 +TT	-88.4 +TT	-87.9 +TT	-87.4 +TT	
	15		-98.0 +TT	-96.2 +TT	-94.9 +TT			-91.8 +TT	-90.8 +TT					
n78	30		-98.3 +TT	-96.3 +TT	-95.1 +TT			-91.9 +TT	-90.9 +TT	-90.1 +TT	-88.8 +TT	-88.3 +TT	-87.8 +TT	TDD
	60		-98.7 +TT	-96.6 +TT	-95.3 +TT			-92.1 +TT	-91.0 +TT	-90.2 +TT	-88.9 +TT	-88.4 +TT	-87.9 +TT	
	15							-91.8 +TT	-90.8 +TT					
n79	30							-91.9 +TT	-90.9 +TT	-90.1 +TT	-88.8 +TT		-87.8 +TT	TDD
	60							-92.1 +TT	-91.0 +TT	-90.2 +TT	-88.9 +TT		-87.9 +TT	
NOTE 2 T NOTE 3: F	he requir or these l onfigurati	ement is r bandwidth on.	nodified b is, the mir	oy -0.5 dB nimum re	when the quiremen	e assigne ts are res	ed operating d UE channe tricted to ope	band excer I bandwidth ration wher	ot for two R	x vehicula d within 3	ar UE. 300 - 380			CA
							l in Table 7.3 <u>d UE channe</u>		is confine	d within 3	300 - 380	0 MHz.		

For the UE that supports any of the SUL operation given in Table 7.3C.0.2-2, exceptions to the requirements specified in Table 7.3C.2.5-1 or Table 7.3C.2.5-2 are allowed when the uplink is active in a lower frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band as noted in Table 7.3C.0.2-2. For these exceptions, the UE shall meet the requirements specified in clause 7.3C.2.5.1.

7.3C.2.5.1 Reference sensitivity exceptions due to harmonic issue

For SUL operation with DL band listed in Table 7.3C.0.2.3-2 with supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.0.2.3-1, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in Table 7.3C.2.5.1-1 due to harmonic exceptions.

C 111			808				Dov	vnlink Chan	nel Bandwid	th / REFSE	NS requiren	nent				
SUL band	DL band	Test ID	Test ID	SCS	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100
Dano			kHz	dBm	dBm	dBm	dBm	dBm	dBm	dBm	dBm	dBm	dBm	dBm	dE	
		1	30												-85	
															+1	
															+	
															-85.6	
															+1	
n80	n78¹														+T	
		2	15				-92.7									
							+0.3 +TT									
							-92.7 -2.2									
							+0.3									
							+TT ³									
			all be the bas				two Rx vehic	ular UE.								
			et to PUMAX as													
NOTE 3:	Applicable or	nly if operatio	n with 4 anter	nna ports is s	upported in t	he band with	SUL configu	red								

Table 7.3C.2.5.1-1: Reference sensitivity for SUL operation (exceptions due to harmonic issue)

Table 7.3C.2.5.1-2: Void

For the UE which supports SUL band combination, the test requirement for reference sensitivity in Tables 7.3C.2.5-1, 7.3C.2.5-2 and 7.3C.2.5-1, 7.3C.

7.3C.3 Reference sensitivity power level for SUL (3CC)

Editor's Note:

- No test points defined for Reference sensitivity power level testing for SUL with DL CA. This test case is covered by 7.3.2 and 7.3C.2.

7.3C.3.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under SUL and 2 DL CA operation and conditions of low signal level, ideal propagation and no added noise.

7.3C.3.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports SUL operation on the SUL bands with 2DL CA.

7.3C.3.3 Minimum conformance requirement

The minimum conformance requirements are defined in clause 7.3C.0.

7.3C.3.4 Test description

NOTE: No testing needs to be performed since the testing has been covered in test case 7.3.2 and 7.3C.2.

For band combination CA_nX_SUL_nY-nZ, test the REFSENS of SUL configuration or NR band as listed in table 7.3C.3.4-1.

 Table 7.3C.3.4-1: Test band combinations and configuration

Band configuration	Verifying REFSENS of SUL configurations/ NR band	Subtest case	Table with test parameters to select	
	SUL_n78A-n80A	7.3C.2	Table 7.3C.2.4.1-1	
CA_n1A_SUL_n78A-n80A	n1	7.3.2	Table 7.3.2.4.1-1	
	SUL_n78A-n84A	7.3C.2	Table 7.3C.2.4.1-1	
CA_n1A_SUL_n78A-n84A	n1	7.3.2	Table 7.3.2.4.1-1	
	SUL_n78A-n80A	7.3C.2	Table 7.3C.2.4.1-1	
CA_n3A_SUL_n78A-n80A	n3	7.3.2	Table 7.3.2.4.1-1	
CA_n28A_SUL_n41A-	SUL_n41A-n83A	7.3C.2	Table 7.3C.2.4.1-1	
n83A	n28	7.3.2	Table 7.3.2.4.1-1	
SUL_n79C-n83A	SUL_n79A-n83A	7.3C.2	Table 7.3C.2.4.1-1	
CA_n28A_SUL_n79A-	SUL_n79A-n83A	7.3C.2	Table 7.3C.2.4.1-1	
n83A	n28	7.3.2	Table 7.3.2.4.1-1	

7.3C.3.5 Test requirement

Same test requirement as clause 7.3.2 and 7.3C.2 for each band or band combinations listed in table 7.3C.3.4-1.

7.3D Reference sensitivity for UL MIMO

7.3D.1 General

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in subclause 7.3 shall be met with the UL MIMO configurations described in clause 6.2D.1. For UL MIMO, the parameter P_{UMAX} is the total transmitter power over the two transmits power over the two transmit antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.3D

7.3D.2 Reference sensitivity power level for UL MIMO

7.3D.2.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

7.3D.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

7.3D.2.3 Minimum conformance requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in subclause 7.3 shall be met with the UL MIMO configurations described in clause 6.2D.1. For UL MIMO, the parameter P_{UMAX} is the total transmitter power over the two transmits power over the two transmit antenna connectors

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.3D and 7.3.

7.3D.2.4 Test description

7.3D.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3D.2.4.1-1, Table 7.3D.2.4.1-2, and Table 7.3D.2.4.1-3. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexe A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

			Initial Conditions				
Test Envir [5] subclau	onment as specifie	d in TS 38.508-1	Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Freque		1 in TS 38.508-1 [5]	Low range, Mid range, High range				
	nel Bandwidths as 5] subclause 4.3.1	specified in TS	Lowest, Mid, Highest				
Test SCS	as specified in Tab	e 5.3.5-1	Lowest				
			Test Parameters				
Test ID	Downlink	Configuration	Uplink Configuration				
	Modulation	RB allocation	Modulation	RB allocation			
1	CP-OFDM QPSK	Full RB (NOTE 1)	CP-OFDM QPSK	REFSENS (NOTE 2)			
NOTE 1:	Full RB allocation :	shall be used per ead	ch SCS and channel BW as specified in T	able 7.3.2.4.1-2.			
NOTE 2:	REFSENS refers to	o Table 7.3.2.4.1-3 w	hich defines uplink RB configuration and	start RB location for each			
	SCS, channel BW	and NR band.					
	NOTE 3: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.						

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A Figure A.3.1.1.2 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.

- 4. The UL and DL Reference Measurement Channel is set according to Table 7.3D.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3D.2.4.3.
- 7.3D.2.4.2 Test procedure

Same test procedure as specified in 7.3.2.4.2 with the following exception:

Step 2: SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.3D.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. The PDCCH DCI format 0_1 is specified with condition 2TX_UL_MIMO in 38.508-1 [5] subclause 4.3.6.1.1.2.

7.3D.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO and exceptions listed in clause 7.3.2.4.3

7.3D.2.5 Test requirement

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annex A3.2 with reference receive power level specified in Tables 7.3.2.5-1 and parameters specified Tables 7.3D.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3.

7.3E Reference sensitivity for V2X

7.3E.1 General

The reference sensitivity power level $P_{REFSENS_V2X}$ is the minimum mean power applied to each one of the UE antenna ports for V2X UE, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

7.3E.2 Reference sensitivity for V2X / non-concurrent operation

Editor's Note: The following aspects are not yet determined:

- TP analysis is FFS

7.3E.2.1 Test purpose

The test purpose is to verify the ability of the UE to receive V2X physical channel data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

7.3E.2.2 Test applicability

This test case applies to all types of NR UE release 16 and forward that support NR V2X sidelink communication.

7.3E.2.3 Minimum conformance requirements

When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E-1, the throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.3E.2.3-1.

		Channel bandwidth / PREFSENS_V2X(dBm)							
NR V2X Band	SCS kHz	10 MHz	20 MHz	30 MHz	40 MHz	Duplex Mode			
	15	-96.5	-93.2	-91.4	-90.1	HD			
n38	30	-96.1	-93.4	-91.7	-90.2	HD			
	60	-96.9	-93.1	-91.9	-90.4	HD			
	15	-92.5	-89.2	-87.4	-86.1	HD			
n47	30	-92.1	-89.4	-87.7	-86.2	HD			
	60	-92.9	-89.1	-87.9	-86.4	HD			
NOTE 1:	Reference I	neasurement ch	annel is defined	in A.7.2.		-			
NOTE 2:	The signal j	ower is specifie	ed per antenna p	ort.					
NOTE 3: Y		•	•						

Table 7.3E.2.3-1: Reference sensitivity of NR V2X Bands (PC5)

Table 7.3E.2.3-2: Sidelink TX configuration for reference sensitivity of NR V2X Bands (PC5)

NR Band / SCS / Channel bandwidth / Duplex mode											
NR V2X Band	SCS kHz	10 MHz	20 MHz	30 MHz	40 MHz	Duplex Mode					
n38	15	50	105	160	216	HD					
	30	24	50	75	105	HD					
	60	10 ²	24	36	50	HD					
n47	15	50	105	160	216	HD					
	30	24	50	75	105	HD					
	60	10 ²	24	36	50	HD					
NOTE 1: The sidelink allocated RB (L _{CRB}) size could be adjusted according to resource pool configuration in [6]. NOTE 2: For the case, 11 RB is allowed for S-SS/PSBCH Block.											

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.3E.2.

7.3E.2.4 Test description

7.3E.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2E.1-1 and Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3E.2.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annexe A.7.2 and the GNSS configuration in TS 38.508-1 [5] subclause 4.11.

		Initial Conditions
Test Enviro	nment as specified in TS 38.508-1	[Normal, TL/VL, TL/VH, TH/VL, TH/VH]
	encies as specified in TS 38.508-1 [5]	[Mid range]
	el Bandwidths as specified in TS] subclause 4.3.1	[Lowest, Highest]
Test SCS a	s specified in Table 5.3.5-1	[Lowest]
		Test Parameters
Test ID		V2X Configuration to receive
	Modulation	RB allocation
1 [CP-OFDM QPSK]		[Full RB (NOTE 1)]
NOTE 1: F	L Full RB allocation shall be used per eac	ch SCS and channel BW as specified in Table 7.3E.2.4.1-2.

Channel Bandwidth	SCS(kHz)	LCRBmax	Outer RB allocation / Normal RB allocation					
	15	52	50@0					
10MHz	30	24	24@0					
	60	11	10@0					
	15	106	105@0					
20MHz	30	51	50@0					
	60	24	24@0					
	15	160	160@0					
30MHz	30	78	75@0					
	60	38	36@0					
	15	216	216@0					
40MHz	30	106	105@0					
	60	51	50@0					
NOTE 1: Test Channel Bandwidths are checked separately for each NR band, the applicable channel bandwidths are specified in Table 5.3.5-1.								

Table 7.3E.2.4.1-2: PSSCH Configuration for REFSENS

- Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.9.1 for TE diagram and section A.3.2.7 for UE diagram.
- The parameter settings for the NR sidelink transmission over PC5 are pre-configured according to TS 38.508-1
 [5] subclause 4.10. Message content exceptions are defined in clause 7.3E.2.4.3.
- 3. The V2X Reference Measurement Channel is set according to Table 6.2E.1.1.4.1-1.
- 4. The GNSS simulator is configured for Scenario #1: static in Geographical area #1, as defined in TS 38.508-1 [5] Table 4.11.2-2. Geographical area #1 is also pre-configured in the UE.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State Out_of_Coverage with generic procedure parameters Sidelink *On*, Test Loop Function *On* with UE test loop mode E closed for *Transmit Mode* according to TS 38.508-1 [5] clause 4.5.
- 7. Trigger the UE to reset UTC time. (NOTE: The UTC time reset may be performed by MMI or AT command (+CUTCR).)
- 8. The GNSS simulator is triggered to start step 1 of Scenario #1 to simulate a location in the centre of Geographical area #1. Wait for the UE to acquire the GNSS signal and start to transmit.

7.3E.2.4.2 Test procedure

- 1. The UE starts to perform the NR V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.3G.1.4.1-1.
- 2. Set the signal level of V2X to the appropriate REFSENS value defined in Table 7.3G.1.3-1.
- 3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
- 7.3E.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 and 5.4.

7.3E.2.5 Test requirement

When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E-1, the throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.3E.2.5-1.

		Channel bandwidth / PREFSENS_V2X(dBm)								
NR V2X Band	SCS kHz	10 MHz	20 MHz	30 MHz	40 MHz	Duplex Mode				
	15	-96.5+TT	-93.2+TT	-91.4+TT	-90.1+TT	HD				
n38	30	-96.1+TT	-93.4+TT	-91.7+TT	-90.2+TT	HD				
	60	-96.9+TT	-93.1+TT	-91.9+TT	-90.4+TT	HD				
	15	-92.5+TT	-89.2+TT	-87.4+TT	-86.1+TT	HD				
n47	30	-92.1+TT	-89.4+TT	-87.7+TT	-86.2+TT	HD				
	60	-92.9+TT	-89.1+TT	-87.9+TT	-86.4+TT	HD				
NOTE 1: Reference measurement channel is defined in A.8.										
NOTE 2:	NOTE 2: The signal power is specified per antenna port.									
NOTE 3:	TT for each	frequency and o	channel bandwid	th is specified in	n Table 7.3.2.5-3	3.				

Table 7.3E.2.5-1: Reference sensitivity of NR V2X Bands (PC5)

7.3F Reference sensitivity for shared spectrum channel access

7.3F.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

In later clauses of Clause 7 where the value of REFSENS is used as a reference to set the corresponding requirement, the UE shall be verified against those requirements by applying the REFSENS value in Table 7.3G.2-1 with 2 Rx antenna ports tested.

7.3F.2 Reference sensitivity power level

Editor's Note: The following aspects are not yet determined:

- Message content for NS_53 is FFS
- TT for $5.925GHz < f \le 7.125GHz$ is TBD

7.3F.2.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

7.3F.2.2 Test applicability

This test case applies to all types of NR UE release 16 and forward that support NR standalone shared spectrum channel access.

7.3F.2.3 Minimum conformance requirements

The throughput shall be \geq 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3F.2.3-1, Table 7.3F.2.3-2, and Table 7.3F.2.3-3.

Ор	Operating band / SCS / Channel bandwidth											
Operating Band	SCS kHz	20 MHz (dBm)	40 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)							
n46	15	-89.7	-86.6									
	30	-89.9	-86.7	-84.8	-83.6							
	60	-90.1	-86.9	-85.0	-83.6							
n96	15	-89.2	-86.1									
	30	-89.4	-86.2	-84.3	-83.1							
	60	-89.6	-86.4	-84.5	-83.1							

Table 7.3F.2.3-1: Two antenna port reference sensitivity QPSK PREFSENS

For UE(s) equipped with 4 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3F.2.3-1 shall be modified by the amount given in $\Delta R_{IB,4R}$ in Table 7.3F.2.3-2 for the applicable operating bands.

Table 7.3F.2.3-2: Four antenna port reference sensitivity allowance $\Delta R_{IB,4R}$

Operating band	ΔR _{IB,4R} (dB)
n46, n96	-2.2

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3F.2.3-1 and Table 7.3F.2.3-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3F.2.3-3.

Table 7.3F.2.3-3: Uplink configuration for reference sensitivity
--

Operating band / SCS / Channel bandwidth								
Operating Band	SCS kHz	20 MHz (dBm)	40 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)			
n46	15	100	216					
	30	50	100	162	216			
	60	24	50	75	100			
n96	15	100	216					
	30	50	100	162	216			
	60	24	50	75	100			

Unless given by Table 7.3F.2.3-4, the minimum requirements specified in Tables 7.3F.2.3-1 and 7.3F.2.3-2 shall be verified with the network signalling value NS_01 (Table 6.2F.3.1-1) configured.

Table 7.3F.2.3-4: Network signalling value for reference sensitivity

Operating band	Network Signalling value		
n46	NS_01		
n96	NS_53		

The normative reference for this requirement is TS 38.101-1 [2] clause 7.3F.2.

7.3F.2.4 Test description

7.3F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3F.2.4.1-1, Table 7.3F.2.4.1-2, and Table 7.3F.2.4.1-3 The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

			Initial Conditions					
Test Environment as specified in TS 38.508-1 [5] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 38.508-1 [5] subclause4.3.1			Low range, Mid range, High range					
	Test Channel Bandwidths as specified in TS 38.508-1 [5] subclause 4.3.1		Lowest, Mid, Highest					
Test SCS a	Test SCS as specified in Table 5.3.5-1		Lowest					
	Test Parameters							
Test ID	Downlink	Configuration	Uplink Configuration					
	Modulation RB allocation		Modulation	RB allocation				
1	CP-OFDM QPSK	Full RB (NOTE 1)	DFT-s-OFDM QPSK	REFSENS (NOTE 2)				
NOTE 1:	NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3F.2.4.1-2.							
NOTE 2:	NOTE 2: REFSENS refers to Table 7.3F.2.4.1-3 which defines uplink RB configuration and start RB location for each							
:	SCS, channel BW and NR band.							
NOTE 3:	NOTE 3: For a band where UE supports 4Rx, the test needs to be repeated with only 2Rx antennas connected and							
1	the other antennas terminated.							

Table 7.3F.2.4.1-2: Downlink Configuration of each RB allocation

Channel Bandwidth	SCS(kHz)	LCRBmax	Outer RB allocation / Normal RB allocation		
	15	106	106@0		
20MHz	30	51	51@0		
	60	24	24@0		
	15	216	216@0		
40MHz	30	106	106@0		
	60	51	51@0		
	15	N/A	N/A		
60MHz	30	162	162@0		
	60	79	79@0		
	15	N/A	N/A		
80MHz	30	217	217@0		
	60	107	107@0		
NOTE 1: Test Channel Bandwidths are checked separately for each NR band, the applicable channel bandwidths are specified in Table 5.3.5-1.					

Operating band / SCS / Channel bandwidth						
Operating Band	SCS kHz	20 MHz (dBm)	40 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	Duplex Mode
	15	100@0	216@0			
n46	30	50@0	100@0	162@0	216@0	TDD
	60	24@0	50@0	75@0	100@0	
	15	100@0	216@0			
n96	30	50@0	100@0	162@0	216@0	TDD
	60	24@0	50@0	75@0	100@0	

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and Reference Measurement Channel is set according to Table 7.3F.2.4.1-1, Table 7.3F.2.4.1-2, and Table 7.3F.2.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3F.2.4.3.

7.3F.2.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.3F.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.3F.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3F.2.5-1 if 2Rx antennas connected or Table 7.3F.2.5-2 if 4Rx antennas connected. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits PUMAX level for at least the duration of the Throughput measurement.
- 4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2
- 7.3F.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6 ensuring Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED for NR band.

Message contents are according to TS 38.508-1[5] subclause 4.6 with the following exceptions for each network signalling value.

7.3F.2.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 38.508-1 [5] subclause 4.6 can be used without exceptions.

7.3F.2.4.3.2 Message contents exceptions (network signalled value "NS_53")

FFS

7.3F.2.5 Test requirement

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A3.2 with reference receive power level specified in Tables 7.3F.2.5-1 for 2 Rx antenna port, Tables 7.3F.2.5-2 for 4 Rx antenna port, and parameters specified Tables 7.3F.2.4.1-1, Tables 7.3F.2.4.1-2 and Tables 7.3F.2.4.1-3.

Table 7.3F.2.5-1: Reference sensitivity QPSK PREFSENS

Operating band / SCS / Channel bandwidth / Duplex-mode						
Operating BandSCS20406080DuplexMHzMHzMHzMHzMHzMHzMHzMHz(dBm)(dBm)(dBm)(dBm)(dBm)MHzMode						
n46	15	-89.7+TT	-86.6+TT			TDD

	30	-89.9+TT	-86.7+TT	-84.8+TT	-83.6+TT		
	60	-90.1+TT	-86.9+TT	-85.0+TT	-83.6+TT		
	15	-89.2+TT	-86.1+TT				
n96	30	-89.4+TT	-86.2+TT	-84.3+TT	-83.1+TT	TDD	
	60	-89.6+TT	-86.4+TT	-84.5+TT	-83.1+TT		
NOTE 1: The transmitter shall be set to P _{UMAX} as defined in subclause 6.2F.4 NOTE 2: TT for each frequency and channel bandwidth is specified in Table 7.3F.2.5-3.							

Operating band / SCS / Channel bandwidth / Duplex-mode								
Operating Band	Band (dBm) (dBm) (dBm) (dBm)							
	15	-91.9+TT	-88.8+TT					
n46	30	-92.1+TT	-88.9+TT	-87.0+TT	-85.8+TT	TDD		
	60	-92.3+TT	-89.1+TT	-87.2+TT	-85.8+TT			
	15	-91.4+TT	-88.3+TT					
n96	30	-91.6+TT	-88.4+TT	-86.5+TT	-85.3+TT	TDD		
	60	-91.8+TT	-88.6+TT	-86.7+TT	-85.3+TT			
NOTE 1: Four Rx antenna ports shall be the baseline for above listed operating								
band except for two Rx vehicular UE.								
NOTE 4: TT for each frequency and channel bandwidth is specified in Table 7.3F.2.5-3.								

Table 7.3F.2.5-3: Test Tolerance	e (TT) for RX sensitivity level
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f ≤ 3.0GHz	3.0GHz < f ≤ 6.0 GHz	5.925GHz < f ≤ 7.125GHz
0.7 dB	1.0 dB	TBD

For the UE which supports inter-band carrier aggregation, the minimum requirement for reference sensitivity in Table 7.3F.2.5-1 shall be increased by the amount given in $\Delta R_{IB,c}$ defined in subclause 7.3F.3 for the applicable operating bands.

7.3F.3 ARIB,c

For a UE supporting CA or DC band combination, the minimum requirement for reference sensitivity in Table 7.3F.2.3-1 shall be increased by the amount given by $\Delta R_{IB,c}$ defined in Table 7.3F.3-1. Unless otherwise stated, $\Delta R_{IB,c}$ is set to zero.

Inter-band CA combination	Operating Band	ΔR _{IB,c} (dB)
CA_n46-n48	n46	0
	n48	0.5

In case the UE supports more than one of band combinations for CA or DC, and an operating band belongs to more than one band combinations then the applicable additional $\Delta R_{IB,c}$ shall be the maximum value for all band combinations defined in clause 7.3A and 7.3F.3 in this specification and 7.3A, 7.3B in TS 38.101-3 [4] for the applicable operating bands.

7.3G Reference sensitivity for Tx Diversity

For UE supporting Tx diversity, the minimum requirements specified in Table FFS and Table FFS shall be met with Tx diversity configuration described in clause 6.2G.1. For Tx diversity, the parameter P_{UMAX} is defined in clause FFS with the sum of the output power from both UE antenna connectors.

7.3I Reference sensitivity for RedCap

7.3I.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

7.3I.2 Reference sensitivity power level

7.3I.2.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

7.3I.2.2 Test applicability

This test case applies to all types of NR UE release 17 and forward that support NR RedCap.

7.3I.2.3 Minimum conformance requirements

For a RedCap UE equipped with 2 Rx antenna ports, the throughput shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2.3-1a and Table 7.3.2.3-1b for the applicable operating bands. The reference sensitivity (REFSENS) requirement specified for a RedCap UE equipped with 2 Rx antenna ports shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-3 and, for FDD bands, with the Tx-Rx separation as defined in clause 5.4.4 for the applicable band and UE channel bandwidth.

For a RedCap UE equipped with 1 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3.2.3-1a and in Table 7.3.2.3-1b shall be modified by the amount given in ΔR_{1R} in Table 7.3I.2.3-1 for the applicable operating bands. The reference sensitivity (REFSENS) requirement specified for a RedCap UE equipped with 1 Rx antenna ports shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-3 and, for FDD bands, with the Tx-Rx separation as defined in clause 5.4.4 for the applicable band and UE channel bandwidth.

Operating band	Channel bandwidth (MHz)	ΔR 1 R (dB)
TDD band	5, 10, 15, 20	2,5
FDD band	5	2.5
FDD band	10, 15, 20	3

For a RedCap UE equipped with 2 Rx antenna ports operating in HD-FDD mode, reference sensitivity for 2Rx antenna ports in Table 7.3I.2.3-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3I.2.3-5.

Operating band / SCS / Channel bandwidth							
Operating	SCS	5 MHz	10 MHz	15 MHz	20 MHz		
Band	kHz	(dBm)	(dBm)	(dBm)	(dBm)		
	15	-100.0	-96.8	-95.0	-93.7		
n1	30		-97.2	-95.2	-93.9		
	60		-97.5	-95.4	-94.2		
	15	-98.8	-95.6	-93.8	-92.5		
n2	30		-96.0	-94.0	-92.7		
	60		-96.3	-94.2	-93.0		
	15	-97.8	-94.6	-92.8	-91.5		
n3	30		-95.0	-93.0	-91.7		
	60		-95.3	-93.2	-92.0		
n5	15	-98.8	-95.6	-93.8	-92.5		
115	30		-96.0	-94.0	-92.7		
	15	-98.8	-95.6	-93.8	-92.5		
n7	30		-96.0	-94.0	-92.7		
	60		-96.3	-94.2	-93.0		
n8	15	-97.8	-94.6	-92.8	-91.5		
110	30		-95.0	-93.0	-91.7		
n12	15	-97.8	-94.6	-92.8			
1112	30		-95.0	-93.0			
n13	15	-97.8	-94.6				
	30		-95.0				
n14	15	-97.8	-94.6				
	30		-95.0				
n18	15	-100.0	-96.8	-95.0			
	30		-97.2	-95.2			
n20	15	-97.8	-94.6	-92.8	-91.5		
	30		-95.0	-93.0	-91.7		
	15	-100.0	-96.8				
n24	30		-97.2				
	60		-97.5				
	15	-97.3	-94.1	-92.3	-91.0		
n25	30		-94.5	-92.5	-91.2		
	60	00.0	-94.8	-92.7	-91.5		
n26	15	-98.3	-95.1	-93.3	-92.0		
	30	00.2	-95.5	-93.5	-92.2		
n28	15	-99.3	-96.1 -96.5	-94.3	-93.0 -93.2		
	30	00 5		-94.5	-93.2		
n30	15 30	-99.5	-96.3 -96.7				
		-100.0		-05.0	-02 7		
n65	15 30	-100.0	-96.8 -97.2	-95.0 -95.2	-93.7		
105	60		-97.2	-95.2	-93.9 -94.2		
	15	-100.0	-97.5	-95.4	-94.2		
n66	30	-100.0					
n66	60		-97.2 -97.5	-95.2 -95.4	-93.9 -94.2		
	15	-100.0	-96.8	-95.4	-94.2		
n70	30	100.0	-90.0	-95.2	-93.9		
1170	60		-97.5	-95.4	-93.9		
n71	15	-98.0	-97.5	-93.0	-94.2		
	30	50.0	-94.0	-93.2	-91.9		
	15	-100.0	-96.8	-95.0	-93.7		
n74	30	100.0	-97.2	-95.2	-93.9		
	60		-97.5	-95.4	-94.2		
	15	-97.8	-94.6	-92.8	01.2		
n85	30	01.0	-95.0	-93.0			
L	00		00.0	00.0			

For a RedCap UE equipped with 1 Rx antenna ports and operating in HD-FDD mode, reference sensitivity for 1Rx antenna ports in Table 7.3I.2.3-4 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3I.2.3-5.

Table 7.3I.2.3-4: HD-FDD RedCap UE with 1 Rx antenna port reference sensitivity

Operating band / SCS / Channel bandwidth							
Operating	SCS 5 MHz		10 MHz	15 MHz	20 MHz		
Band	kHz	(dBm)	(dBm)	(dBm)	(dBm)		
	15	-97.5	-94.3	-92.5	-91.2		
n1	30		-94.7	-92.7	-91.4		
	60		-95.0	-92.9	-91.7		
	15	-96.3	-93.1	-91.3	-90.0		
n2	30		-93.5	-91.5	-90.2		
	60		-93.8	-91.7	-90.5		
	15	-95.3	-92.1	-90.3	-89.0		
n3	30		-92.5	-90.5	-89.2		
	60		-92.8	-90.7	-89.5		
	15	-96.3	-93.1	-91.3	-90.0		
n5	30		-93.5	-91.5	-90.2		
	15	-96.3	-93.1	-91.3	-90.0		
n7	30		-93.5	-91.5	-90.2		
	60		-93.8	-91.7	-90.5		
	15	-95.3	-92.1	-90.3	-89.0		
n8	30		-92.5	-90.5	-89.2		
- 40	15	-95.3	-92.1	-90.3			
n12	30		-92.5	-90.5			
10	15	-95.3	-92.1				
n13	30		-92.5				
	15	-95.3	-92.1				
n14	30	00.0	-92.5				
	15	-97.5	-94.3	-92.5			
n18	30	0110	-94.7	-92.7			
	15	-95.3	-92.1	-90.3	-89.0		
n20	30	0010	-92.5	-90.5	-89.2		
	15	-97.5	-94.3	00.0	00.2		
n24	30		-94.7				
	60		-95.0				
	15	-94.8	-91.6	-89.8	-88.5		
n25	30	0.110	-92.0	-90.0	-88.7		
1120	60		-92.3	-90.2	-89.0		
	15	-95.8	-92.6	-90.8	-89.5		
n26	30	00.0	-93.0	-91.0	-89.7		
	15	-96.8	-93.6	-91.8	-90.5		
n28	30	00.0	-94.0	-92.0	-90.7		
	15	-97.0	-93.8	02.0	0011		
n30	30	57.0	-94.2				
	15	-97.5	-94.3	-92.5	-91.2		
n65	30	07.0	-94.7	-92.7	-91.4		
100	60		-95.0	-92.9	-91.7		
	15	-97.5	-94.3	-92.5	-91.2		
n66	30	07.0	-94.7	-92.7	-91.4		
100	60		-95.0	-92.9	-91.7		
	15	-97.5	-94.3	-92.5	-91.2		
n70	30	07.0	-94.7	-92.7	-91.4		
	60		-95.0	-92.9	-91.7		
	15	-95.5	-92.3	-90.5	-89.2		
n71	30	00.0	-92.7	-90.7	-89.4		
	15	-97.5	-94.3	-92.5	-91.2		
n74	30	51.5	-94.7	-92.7	-91.2		
	60		-94.7	-92.9	-91.7		
	15	-95.3	-93.0	-92.9	51.7		
n85	30	55.5	-92.1	-90.5	1		
	50		-92.0	-30.0			

Operating band / SCS / Channel bandwidth							
Operating Band	SCS kHz	5 MHz	10 MHz	15 MHz	20 MHz		
	15	25	50	75	100		
n1	30		24	36	50		
	60		10	18	24		
	15	25	50	75	100		
n2	30		24	36	50		
	60		10	18	24		
	15	25	50	75	100		
n3	30		24	36	50		
	60		10	18	24		
n5	15	25	50	75	100		
CII	30		24	36	50		
	15	25	50	75	100		
n7	30		24	36	50		
			10	18	24		
~ <u>^</u>	15	25	50	75	100		
n8	30		24	36	50		
-10	15	25	50	75			
n12	30		24	36			
	15	25	50				
n13	30	-	24				
	15	25	50				
n14	30		24				
	15	25	50	75			
n18	30	20	24	36			
	15	25	50	75	100		
n20	30	20	24	36	50		
	15	25	50	00	00		
n24	30	20	24				
1124	00		10				
	15	25	50	75	100		
n25	30	20	24	36	50		
112.5	60		10	18	24		
	15	25	50	75	100		
n26	30	25	24	36	50		
	15	25	50	75	100		
n28	30	20	24	36	50		
	30 15	25	50	30	50		
n30	30	20	24				
		25		75	100		
n65	15 30	25	50 24	75 36	100		
601	30				50		
	45	05	10	18	24		
	15	25	50	75	100		
n66	30		24	36	50		
	45	25	10	18	24		
	15	25	50	75	100		
n70	30		24	36	50		
	45	05	10	18	24		
n71	15	25	50	75	100		
	30	07	24	36	50		
	15	25	50	75	100		
n74	30		24	36	50		
			10	18	24		
n85	15	25	50	75			
100	30		24	36			

 Table 7.3I.2.3-5: Uplink configuration for HD-FDD reference sensitivity

The normative reference for this requirement is TS 38.101-1 [2] clause 7.3I.2.

7.3I.2.4 Test description

7.3I.2.4.1 Initial conditions

For RedCap UE with 1Rx or 2 Rx antenna ports, same initial conditions as in 7.3.2.4.1 with following exception:

- The test channel bandwidth are specified in TS 38.508-1 [5] subclause 4.3.1 for RedCap.

For HD-FDD RedCap UE with 1 Rx or 2 Rx antenna ports, same initial conditions as in 7.3.2.4.1 with following exception:

- The test channel bandwidth are specified in TS 38.508-1 [5] subclause 4.3.1 for RedCap.
- The RB allocation for uplink configuration in Table 7.3.2.4.1-1 refers to Table 7.3I.2.4.1-1 for each SCS, channel BW and NR band.

Table 7.3I.2.4.1-1: Uplink configuration for reference sensitivity of HD-FDD RedCap UE, L_{CRB} @ RBstart format

Band HHz MHz MHz MHz MHz MHz MHz 15 25@0 50@2 75@4 100@6 HD- FDD 30 24@0 36@2 50@1 FDD 60 10@1 18@0 24@0 50@1 FDD 76 50@2 75@4 100@6 FDD FDD 76 25@0 50@2 75@4 100@6 FDD 76 30 24@0 36@2 50@1 FDD 70 30 24@0 36@2 50@1 FDD 71 30 24@0 36@2 50@1 FDD 71 30 24@0 36@2 50@1 FDD 71 30<	Operating	SCS	5	10	15	20	Duplex
11 30 24@0 36@2 50@1 HD- FDD 15 25@0 50@2 75@4 100@6 FDD 10 24@0 36@2 50@1 HD- FDD 10 18@0 24@0 36@2 50@1 HD- FDD 10 18@0 24@0 36@2 50@1 FDD 10 18@0 24@0 36@2 50@1 FDD 30 24@0 36@2 50@1 FDD FDD 30 24@0 36@2 50@1 FDD FDD FDD 30 24@0 36@2 50@1 FDD				-			
Initial 30 24@0 36@2 50@1 FDD 60 10@1 18@0 24@0 36@2 50@1 FDD 30 24@0 36@2 50@1 FDD FDD 60 10@1 18@0 24@0 36@2 50@1 FDD 75 15 25@0 50@2 75@4 100@6 FDD 70 25@0 50@2 75@4 100@6 FDD 71 15 25@0	n1	15	25@0	50@2	75@4	100@6	HD.
60 10@1 18@0 24@0 n2 36 24@0 36@2 50@1 60 10@1 18@0 24@0 n3 25@0 50@2 75@4 100@6 n5 25@0 50@2 75@4 100@6 n60 10@1 18@0 24@0 n60 10@1 18@0 24@0 n60 10@1 18@0 24@0 n8 15 25@0 50@2 75@4 100@6 n12 15 25@0 50@0 HD- n12 15 25@0 50@0 HD- n11 15 25@0 50@0 HD- n20 24@0 36@2 50@1 HD- n21 15 25@0 50@2		30		24@0	36@2	50@1	
n2 30 24@0 36@2 500er 100er FDD 60 10@1 18@0 24@0 36@2 50@1 HD-FD n3 30 24@0 36@2 50@1 HD-FD FDD n3 30 24@0 36@2 50@1 HD-FD FDD n5 15 25@0 50@2 75@4 100@6 FDD n6 10@1 18@0 24@0 36@2 50@1 FDD n7 30 24@0 36@2 50@1 FDD FDD n8 15 25@0 50@2 75@4 100@6 FDD n12 15 25@0 50@0 FDD FDD FDD n14 15 25@0 50@0 FDD FDD FDD n24 15 25@0 50@0 FDD FDD FDD n24 15 25@0 50@2 75@4 100@6 FDD n24		60		10@1	18@0	24@0	
112 30 24%0 30%2 50%2 50%2 50%2 50%2 50%2 50%2 75%4 100%6 HD- FDD 60 10%1 18%0 24%0 36%2 50%1 FDD <		15	25@0	50@2	75@4	100@6	
15 25@0 50@2 75@4 100@6 HD- FDD 30 24@0 36@2 50@1 FDD n5 15 25@0 50@2 75@4 100@6 FDD n7 30 24@0 36@2 50@1 FDD n7 15 25@0 50@2 75@4 100@6 HD- FDD n7 30 24@0 36@2 50@1 FDD n8 15 25@0 50@2 75@4 100@6 FDD n14 15 25@0 50@2 75@4 100@6 FDD n20 15 25@0 50@2 75@4 100@6 FDD n24 10@ 10@1 18@0 24@0<	n2	30		24@0	36@2	50@1	FDD
n3 30 24@0 36@2 50@1 FDD n6 10@1 18@0 24@0 36@2 50@1 FDD n5 15 25@0 50@2 75@4 100@6 FDD n7 30 24@0 36@2 50@1 FDD n7 30 24@0 36@2 50@1 FDD n8 15 25@0 50@2 75@4 100@6 FDD n8 15 25@0 50@2 75@4 00@6 FDD n12 30 24@0 36@2 50@1 FDD n12 15 25@0 50@2 75@4 10@6 FDD n14 15 25@0 50@0 T HD- FDD n20 30 24@0 36@2 50@1 FDD n24 10@0 10@0 FDD FDD FDD n24 10@0 10@0 FDD FDD FDD		60		10@1	18@0	24@0	
113 30 24%0 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 30%2 75%4 100%6 HD, FDD 30 24%0 36%2 50%1 10%26 36%2 50%1 HD, FDD 30 24%0 36%2 50%1 10%66 HD, FDD 30 24%0 36%2 50%1 HD, FDD FDD 30 24%0 36%2 50%1 HD, FDD FDD 30 24%0 36%2 50%0 HD, FDD FDD 114 15 25%0 50%0 TS HD, FDD 120 15 25%0 50%2 75%4 100%0 FDD 120 15 25%0 50%2 75%4 100%6 HD, 121 25%0 50%2 75%4 <td< td=""><td></td><td>15</td><td>25@0</td><td>50@2</td><td>75@4</td><td></td><td></td></td<>		15	25@0	50@2	75@4		
n5 15 25@0 50@2 75@4 100@6 HD- FDD 30 24@0 36@2 50@1 HD- FDD 30 24@0 36@2 50@0 HD- FDD 30 24@0 36@0 50@0 HD- FDD 30 24@0 36@2 50@1 HD- FDD 30 24@0 36@2 50@1 FDD 30 24@0 36@2 50@1 FDD 30 24@0 36@2 50@1 FDD 30 24@0	n3	30		24@0	36@2	50@1	FDD
n5 x6 x60		60		10@1	18@0	24@0	
30 24@0 36@2 50@1 FDD n7 15 25@0 50@2 75@4 100@6 FDD 0 10@1 18@0 24@0 36@2 50@1 FDD n8 15 25@0 50@2 75@4 100@6 FDD n8 15 25@0 50@2 75@4 100 FDD n12 15 25@0 50@0	n5	15	25@0	50@2	75@4	100@6	
n7 30 24@0 36@2 50@1 FDD 60 10@1 18@0 24@0 36@2 50@1 HD- n8 15 25@0 50@2 75@4 100@6 HD- 30 24@0 36@2 50@1 HD- FDD n12 15 25@0 50@0 HD- FDD 30 24@0 36@2 HD- FDD n14 15 25@0 50@0 HD- 30 24@0 36@2 FDD n20 15 25@0 50@0 HD- 30 24@0 36@2 50@0 HD- n24 15 25@0 50@2 75@4 100@6 HD- n24 15 25@0 50@2 75@4 100@6 HD- n25 30 24@0 36@2 50@1 FDD n26 30 24@0 36@2 50@1 FDD n28 <td></td> <td>30</td> <td></td> <td>24@0</td> <td>36@2</td> <td>50@1</td> <td></td>		30		24@0	36@2	50@1	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		15	25@0	50@2	75@4	100@6	
n8 15 25@0 50@2 75@4 100@6 HD- FDD n12 15 25@0 50@2 75@4 HD- FDD n12 15 25@0 50@0 Image: state	n7	30		24@0	36@2	50@1	FDD
n8 30 24@0 36@2 50@1 FDD n12 15 25@0 50@2 75@4 HD- FDD n14 15 25@0 50@0 - HD- FDD n14 15 25@0 50@0 - HD- FDD n20 15 25@0 50@0 75@0 100@0 HD- FDD n20 15 25@0 50@0 - HD- FDD HD- FDD n24 30 24@0 36@0 50@0 HD- FDD n24 30 24@0 36@2 50@1 HD- FDD n25 30 24@0 36@2 50@1 HD- FDD n26 15 25@0 50@2 75@4 100@6 HD- FDD n28 15 25@0 50@2 75@4 100@6 HD- FDD n30 24@0 36@2 50@1 FDD FDD n30 25@0 50@2 75@4 100@6 HD- FDD		60		10@1	18@0	24@0	
30 24@0 36@2 50@1 FDD n12 15 25@0 50@2 75@4 HD- 30 24@0 36@2 IMD HD- n14 15 25@0 50@0 IMD HD- n20 15 25@0 50@0 75@0 100@0 HD- n20 15 25@0 50@0 IMD FDD n20 15 25@0 50@0 IMD FDD n24 30 24@0 36@0 50@0 FDD n24 30 24@0 36@0 50@0 FDD n24 30 24@0 36@0 50@0 FDD n25 25@0 50@2 75@4 100@6 FDD n25 25@0 50@2 75@4 100@6 HD- n26 15 25@0 50@2 75@4 100@6 HD- n28 15 25@0 50@2 75@4 <td< td=""><td>n8</td><td>15</td><td>25@0</td><td>50@2</td><td>75@4</td><td>100@6</td><td></td></td<>	n8	15	25@0	50@2	75@4	100@6	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				24@0	36@2	50@1	
3024@036@2100n141525@050@0	n12		25@0	50@2	75@4		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1112			24@0	36@2		
3024@075@0100150n201525@050@075@0100@0HD-3024@036@050@0FDDn243024@036@050@0FDD3024@0100100FDD6010@010100FDD3024@036@250@1FDD6010@118@024@0n253024@036@250@16010@118@024@0n261525@050@275@4100@61525@050@275@4100@6n281525@050@250@1n3024@036@250@1n653024@036@250@1n651525@050@275@4100@6n663024@036@250@1n663024@036@250@1n6610@118@024@0n703024@036@250@1n711525@050@275@4100@6n711525@050@275@4100@6n711525@050@275@4100@6n711525@050@275@4100@6n711525@050@275@4100@6n713024@036@250@1n743024@036@250@1n743024@	n14		25@0	50@0			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		30		24@0			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	n20	15	25@0	50@0	75@0	100@0	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1120			24@0	36@0	50@0	FDD
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			25@0	50@0			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	n24	30		24@0			FDD
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				10@0			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		15	25@0	50@2	75@4	100@6	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	n25	30		24@0	36@2	50@1	FDD
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				10@1	18@0	24@0	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	n26		25@0	50@2	75@4	100@6	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1120	30		24@0	36@2	50@1	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	n28	15	25@0	50@2	75@4	-	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1120	30		24@0	36@2	50@1	FDD
$ \begin{array}{ c c c c c c c } \hline 30 & 24@0 & 75@4 & 100@6 \\ \hline 15 & 25@0 & 50@2 & 75@4 & 100@6 \\ \hline 30 & 24@0 & 36@2 & 50@1 \\ \hline 60 & 10@1 & 18@0 & 24@0 \\ \hline 60 & 10@1 & 18@0 & 24@0 \\ \hline 30 & 24@0 & 36@2 & 50@1 \\ \hline 60 & 10@1 & 18@0 & 24@0 \\ \hline 60 & 10@1 & 18@0 & 24@0 \\ \hline 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 100 & 10@1 & 18@0 & 24@0 \\ \hline 110 & 118@0 & 24@0 \\ \hline 110 & 21@0 & 36@0 & 50@0 \\ \hline 110 & 21@0 & 36@0 & 50@0 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21@0 & 36@2 & 50@1 \\ \hline 110 & 21&0 & 21&0 \\ \hline 110 &$	n30	15	25@0	50@2			
$\begin{array}{ c c c c c c c } & 10 & 20 & 00 & 20 & 10 & 10 & 10 & 10$	1100	30		24@0			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		15	25@0	50@2	75@4	100@6	
15 25@0 50@2 75@4 100@6 HD- FDD 30 24@0 36@2 50@1 FDD 60 10@1 18@0 24@0 n70 15 25@0 50@2 75@4 100@6 HD- FDD n70 15 25@0 50@2 75@4 100@6 HD- FDD 30 24@0 36@2 50@1 FDD 60 10@1 18@0 24@0 FDD n71 15 25@0 50@0 75@4 100@0 HD- FDD n71 15 25@0 50@0 75@0 100@0 HD- FDD n74 30 24@0 36@2 50@1 HD- FDD	n65	30		24@0	36@2	50@1	FDD
n66 10 100 1000 1000 1000 1000 FDD 30 24@0 36@2 50@1 FDD 60 10@1 18@0 24@0 n70 15 25@0 50@2 75@4 100@6 HD-FDD 30 24@0 36@2 50@1 FDD FDD 30 24@0 36@2 50@1 FDD n71 15 25@0 50@0 75@0 100@0 HD-FD n71 15 25@0 50@2 75@4 100@0 HD-FD n74 30 24@0 36@2 50@1 FDD		60		10@1	18@0	24@0	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		15	25@0	50@2	75@4	100@6	
15 25@0 50@2 75@4 100@6 HD- FDD 30 24@0 36@2 50@1 FDD 60 10@1 18@0 24@0 n71 15 25@0 50@0 75@0 100@0 HD- FDD n71 15 25@0 50@0 75@0 100@0 HD- FDD n74 30 24@0 36@2 50@1 HD- FDD	n66	30		24@0	36@2	50@1	FDD
n70 10 100 100 100 100 100 FDD 30 24@0 36@2 50@1 600 <td></td> <td>60</td> <td></td> <td>10@1</td> <td>18@0</td> <td>24@0</td> <td></td>		60		10@1	18@0	24@0	
1170 30 24@0 30@2 30@1 60 10@1 18@0 24@0 n71 15 25@0 50@0 75@0 100@0 HD-FDD 30 24@0 36@0 50@0 FDD FDD n74 30 24@0 36@2 50@1 HD-FDD	n70	15	25@0	50@2	75@4	100@6	
n71 15 25@0 50@0 75@0 100@0 HD-FDD 30 24@0 36@0 50@0 FDD 15 25@0 50@2 75@4 100@6 HD-FDD n74 30 24@0 36@2 50@1 FDD		30		24@0	36@2	50@1	FUD
n71 <u>30</u> 24@0 36@0 50@0 FDD 15 25@0 50@2 75@4 100@6 HD- FDD 30 24@0 36@2 50@1		60		10@1	18@0	24@0	
30 24@0 36@0 50@0 FDD 15 25@0 50@2 75@4 100@6 HD-FDD 174 30 24@0 36@2 50@1 FDD		15	25@0	50@0	75@0	100@0	
n74 30 24@0 36@2 50@1 FDD	11/1	30		24@0	36@0	50@0	
		15	25@0	50@2	75@4	100@6	
60 10@1 18@0 24@0	n74	30		24@0	36@2	50@1	FDD
		60		10@1	18@0	24@0	

7.3I.2.4.2 Test procedure

Same test procedure as steps 1~4 of clause 7.3.2.4.2 with the following exceptions of step 3.

- Set the Downlink signal level to the appropriate REFSENS value defined in Tables 7.3I.2.5-1, 7.3I.2.5-2 and 7.3I.2.5-5 if 2Rx antennas connected or Tables 7.3I.2.5-3, 7.3I.2.5-4 and 7.3I.2.5-6 if 1Rx antennas connected.

7.3I.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] clause 4.6 ensuring Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED for NR band.

7.3I.2.5 Test requirement

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annex A3.2 with reference receive power level specified in Table 7.3I.2.5-1 and Table 7.3I.2.5-2 for RedCap UE with 2 Rx antenna port, Tables 7.3I.2.5-3 and Table 7.3I.2.5-4 for RedCap UE with single antenna port, Table 7.3I.2.5-5 for HD-FDD RedCap UE with 2 Rx antenna port, Table 7.3I.2.5-6 for HD-FDD RedCap UE single antenna port, and parameters specified Table 7.3.2.4.1-1, Table 7.3.2.4.1-2 and Table 7.3I.2.4.1-1.

Table 7.3I.2.5-1: Two antenna port Reference sensitivity QPSK PREFSENS for FDD bands

Operating Band	SCS kHz	5 MHz	10 MHz	15 MHz	20 MHz	Duplex Mode
	15	-100.0	-96.8	-95.0	-93.8	FDD
	15	+TT	+TT	+TT	+TT	
n1	30		-97.1	-95.1	-94.0	
111	00		+TT	+TT	+TT	_
	60		-97.5	-95.4	-94.2	
		00.0	+TT	+TT	+TT	500
	15	-98.0	-94.8	-93.0	-91.8	FDD
		+TT	<u>+TT</u> -95.1	+TT -93.1	+TT -92.0	
n2	30		-95.1 +TT	-93.1 +TT	-92.0 +TT	
			-95.5	-93.4	-92.2	
	60		+TT	+TT	+TT	
	4.5	-97.0	-93.8	-92.0	-90.8	FDD
	15	+TT	+TT	+TT	+TT	
n3	30		-94.1	-92.1	-91.0	
110	30		+TT	+TT	+TT	
	60		-94.5	-92.4	-91.2	
			+TT	+TT	+TT	
	15	-98.0	-94.8	-93.0	-90.8	FDD
n5	-	+TT	+TT	+TT	+TT	-
	30		-95.1	-93.1	-91.0	
		-98.0	+TT -94.8	+TT -93.0	+TT -91.8	FDD
	15	-98.0 +TT	-94.8 +TT	-93.0 +TT	-91.8 +TT	
_			-95.1	-93.1	-92.0	-
n7	30		+TT	+TT	-52.0 +TT	
	<u> </u>		-95.5	-93.4	-92.2	1
	60		+TT	+TT	+TT	
	15	-97.0	-93.8	-91.4	-85.5	FDD
n8	10	+TT	+TT	+TT	+TT	_
10	30		-94.1	-91.7	-87.2	
		07.0	+TT	+TT	+TT	
	15	-97.0	-93.8	-84.0		FDD
n12	20	+TT	+TT	+TT		-
	30		-94.1 +TT	-84.1 +TT		
	15	-97.0	-93.8	711		FDD
	15	-97.0 +TT	-93.8 +TT			
n14	30		-94.1			1
			+TT			
	15	-97.0	-93.8	-91.0	-89.8	FDD
n20	15	+TT	+TT	+TT	+TT	
n20	30		-94.1	-91.1	-90.0	
			+TT	+TT	+TT	
	15	-100.0	-96.8			FDD
	20	+TT	+TT			-
n24	30		-97.1			
	60		+TT -97.5			-
	00		-97.5 +TT			
	15	-96.5	-93.3	-91.5	-90.3	FDD
		+TT	+TT	+TT	+TT	
- OF	30		-93.6	-91.6	-90.5	
n25			+TT	+TT	+TT	
	60		-94.0	-91.9	-90.7	
			+TT	+TT	+TT	
	15	-97.5	-94.5	-92.7	-87.6	FDD
n26		+TT	+TT	+TT	+TT	
n26	30		-94.8	-92.7	-87.7	

n28	15	-98.5 +TT	-95.5 +TT	-93.5 +TT	-90.8 +TT	FDD		
1120	30		-95.6 +TT	-93.6 +TT	-91.0 +TT			
- 20	15	-99.0 +TT	-95.8 +TT			FDD		
n30	30		-96.1 +TT					
	15	- 99.5+TT	- 96.3+TT	- 94.5+TT	- 93.3+TT	FDD		
n65	30		- 96.6+TT	- 94.6+TT	- 93.5+TT			
	60		- 97.0+TT	- 94.9+TT	- 93.7+TT			
	15	-99.5 +TT	-96.3 +TT	-94.5 +TT	-93.3 +TT	FDD		
n66	30		-96.6 +TT	-94.6 +TT	-93.5 +TT			
	60		-97.0 +TT	-94.9 +TT	-93.7 +TT			
	15	-100.0 +TT	-96.8 +TT	-95.0 +TT	-93.8 +TT	FDD		
n70	30		-97.1 +TT	-95.1 +TT	-94.0 +TT			
	60		-97.5 +TT	-95.4 +TT	-94.2 +TT			
74	15	-97.2 +TT	-94.0 +TT	-91.6 +TT	-86.0 +TT	FDD		
n71	30		-94.3 +TT	-91.9 +TT	-87.4 +TT			
	15	-99.5 ³ +TT	-96.3 ³ +TT	-94.5 ³ +TT	-93.3 ³ +TT	FDD		
n74	30		-96.6 ³ +TT	-94.6 ³ +TT	-93.5 ³ +TT			
	60		-97.0 ³ +TT	-94.9 ³ +TT	-93.7 ³ +TT			
NOTE 2: T	/oid The trans	smitter shal		•	fined in sub	clause		
NOTE 3: 3	indicate				by -0.5 dB fined within			
1 NOTE 4: T	the assigned NR channel bandwidth is confined within 1475.9- 1510.9 MHz. NOTE 4: TT for each frequency and channel bandwidth is specified in Table 7.3I.2.5-7.							

Table 7.3I.2.5-2:	Two antenna	port reference se	ensitivity QPSK	PREFSENS for T	DD bands

Operating b	Operating band / SCS / Channel bandwidth / REFSENS / Duplex Mode					
Operating band	SCS kHz	Channel bandwidth (MHz)	REFSENS (dBm) ⁸	Duplex Mode		

			-100 +	
	15	5, 10, 15	10log ₁₀ (N _{RB} /25)+TT	
n34	30	10, 15	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD
	60	10, 15	-97.5 + 10log ₁₀ (N _{RB} /11)+TT	
	15	5, 10, 15, 20	-100 + 10log10(Nкв/25)+TT	
n381	30	10, 15, 20,	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD
	60	10, 15, 20	-97.5 + 10log ₁₀ (N _{RB} /11)+TT	
	15	5, 10, 15, 20	-100 + 10log10(Nгв/25)+TT	
n39	30	10, 15, 20	-97.1 + 10log10(NRB/24)+TT	TDD
	60	10, 15, 20,	-97.5 + 10log10(Nгв/11)+TT	
	15	5, 10, 15, 20	-100 + 10log ₁₀ (N _{RB} /25)+TT	
n40	30	10, 15, 20	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD
	60	10, 15, 20	-97.5 + 10log ₁₀ (N _{RB} /11)+TT	
	15	10, 15, 20	-94.8 + 10log10(Nкв/50)+TT	
n41 ¹	30	10, 15, 20	-95.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD
	60	10, 15, 20	-95.5 + 10log10(Nrв/11)+TT	
	15	5, 10, 15, 20,	-99 + 10log ₁₀ (N _{RB} /25)+TT -96.1 + 10log ₁₀ (N _{RB} /24)	-
n481	30	10, 15, 20,	+TT -96.5 +	TDD
	60	10, 15, 20,	10log ₁₀ (N _{RB} /11)+TT	
	15	5, 10, 15, 20	-100 + 10log10(Nrв/25)+TT	
n50	30	10, 15, 20	-97.1 + 10log ₁₀ (N _{RB} /24)+TT	TDD
	60	10, 15, 20	-97.5 + 10log ₁₀ (N _{RB} /11)+TT	
n51	15	5	-100+TT	TDD
n53	15	5, 10	-100 + 10log ₁₀ (N _{RB} /25)+TT	TDD
100	30 60	<u> </u>	-97.1+TT -97.5+TT	-
	15	10, 15, 20,	-95.3 + 10log10(Nкв/50)+TT	
n77 ^{1,4}	30	10, 15, 20	-95.6 + 10log ₁₀ (N _{RB} /24)+TT	TDD
	60	10, 15, 20	-96.0 + 10log10(NRB/24)+TT	1
	15	10, 15, 20	-95.8 + 10log10(NRB/T1)+T1 -95.8 + 10log10(NRB/50) +TT	
n781	30	10, 15, 20	-96.1 + 10log ₁₀ (N _{RB} /24) +TT	TDD
	60	10, 15, 20	-96.5 + 10log10(Nкв/11)+TT	1
	15	10, 20,	-89.6 + 10log ₁₀ (N _{RB} /216)+TT	
n79 ¹	30	10, 20,	-89.7 + 10log ₁₀ (N _{RB} /106) +TT	TDD
	60	10, 20	-89.9 + 10log ₁₀ (N _{RB} /51) +TT	1

NOTE 1:	Void
-	
NOTE 2:	The transmitter shall be set to P_{UMAX} as defined in clause 6.2.4.
NOTE 3:	Void
NOTE 4:	The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined
	within 3300 - 3800 MHz.
NOTE 5:	Void
NOTE 6:	Void
NOTE 7:	Void
NOTE 8:	The REFSENS value is rounded to the nearest number down to one decimal point. "NRB" in
	REFSENS formula is the maximum transmission bandwidth configuration as defined in Table
	5.3.2-1.
NOTE 9:	TT for each frequency and channel bandwidth is specified in Table 7.3I.2.5-7.

Table 7.3I.2.5-3: Single antenna port Reference sensitivity QPSK PREFSENS for FDD bands

Operating Band	SCS kHz	5 MHz	10 MHz	15 MHz	20 MHz	Duplex Mode
Duild		-				FDD
	15	100.0+2.5	-96.8	-95.0	-93.8	
		+TT	+3 +TT	+3 +TT	+3 +TT	
n1			-97.1	-95.1	-94.0	
	30		+3 +TT	+3 +TT	+3 +TT	
			-97.5	-95.4	-94.2	
	60		+TT	+TT	+TT	
		-98.0	-94.8	-93.0	-91.8	FDD
	15	+2.5+TT	+3 +TT	+3 +TT	+3 +TT	
0			-95.1	-93.1	-92.0	
n2	30		+3 +TT	+3 +TT	+3 +TT	
	00		-95.5	-93.4	-92.2	
	60		+3 +TT	+3 +TT	+3 +TT	
	4.5	-97.0+2.5	-93.8	-92.0	-90.8	FDD
	15	+TT	+3 +TT	+3 +TT	+3 +TT	
- 0			-94.1	-92.1	-91.0	1
n3	30		+3 +TT	+3 +TT	+3 +TT	
	~~~		-94.5	-92.4	-91.2	1
	60		+3 +TT	+3 +TT	+3 +TT	
	45	-98.0+2.5	-94.8	-93.0	-90.8	FDD
ъ <i>Г</i>	15	+TT	+3 +TT	+3 +TT	+3 +TT	
n5	20		-95.1	-93.1	-91.0	1
	30		+3 +TT	+3 +TT	+3 +TT	
	45	-98.0+2.5	-94.8	-93.0	-91.8	FDD
	15	+TT	+3 +TT	+3 +TT	+3 +TT	
-	20		-95.1	-93.1	-92.0	1
n7	30		+3 +TT	+3 +TT	+3 +TT	
			-95.5	-93.4	-92.2	1
	60		+3 +TT	+3 +TT	+3 +TT	
	45	-97.0+2.5	-93.8	-91.4	-85.8	FDD
-0	15	+TT	+3 +TT	+3 +TT	+3 +TT	
n8	20		-94.1	-91.7	-87.2	1
	30		+3 +TT	+3 +TT	+3 +TT	
	15	-97.0	-93.8	-84.0		FDD
n10		+2.5+TT	+3 +TT	+3 +TT		
n12	30		-94.1	-84.1		
			+3 +TT	+3 +TT		
	15	-97.0+2.5	-93.8			FDD
n14		+TT	+3 +TT			
n14	30		-94.1			
			+3 +TT			
	15	-97.0	-93.8	-91.0	-89.8	FDD
n20	10	+2.5+TT	+3 +TT	+3 +TT	+3 +TT	
1120	20		-94.1	-91.1	-90.0	
	30		+3 +TT	+3 +TT	+3 +TT	
	15	-100.0	-96.8			FDD
		+2.5+TT	+3 +TT			
n24	30		-97.1			
1124			+3 +TT			
	60		-97.5			
			+3 +TT			
	15	-96.5	-93.3	-91.5	-90.3	FDD
		+2.5+TT	+3 +TT	+3 +TT	+3 +TT	
n25	30		-93.6	-91.6	-90.5	
1120			+3 +TT	+3 +TT	+3 +TT	
	60		-94.0	-91.9	-90.7	]
			+3 +TT	+3 +TT	+3 +TT	
	15	-97.5+2.5	-94.5	-92.7	-87.6	FDD
		+TT	+3 +TT	+3 +TT	+3 +TT	
n26	30		-94.8	-92.7	-87.7	1
			+3 +TT	+3 +TT	+3 +TT	1

		T	n	1	n	
	15	-98.5	-95.5	-93.5	-90.8	FDD
n28	10	+2.5+TT	+3 +TT	+3 +TT	+3 +TT	
1120	30		-95.6	-93.6	-91.0	
	00		+3 +TT	+3 +TT	+3 +TT	
	15	-99.0	-95.8			FDD
n30	10	+2.5+TT	+3 +TT			
100	30		-96.1			
	00		+3 +TT			
	15	-99.5	-96.3	-94.5	-93.3	FDD
	10	+2.5+TT	+3+TT	+3+TT	+3+TT	
n65	30		-96.6	-94.6	-93.5	
1100	00		+3 +TT	+3 +TT	+3 +TT	
	60		-97.0	-94.9	-93.7	
	00		+3+TT	+3+TT	+3+TT	
	15	-99.5	-96.3	-94.5	-93.3	FDD
	10	+2.5+TT	+3+TT	+3 +TT	+3 +TT	
n66	30		-96.6	-94.6	-93.5	
noo	- 50		+3 +TT	+3 +TT	+3+TT	
	60		-97.0	-94.9	-93.7	
	00		+3 +TT	+3 +TT	+3 +TT	
	15	-100.0	-96.8	-95.0	-93.8	FDD
		+2.5 +TT	+3 +TT	+3+TT	+3 +TT	
n70	30		-97.1	-95.1	-94.0	
1170	30		+3 +TT	+3 +TT	+3 +TT	
	60		-97.5	-95.4	-94.2	
	00		+3 +TT	+3 +TT	+3 +TT	
	15	-97.2+2.5	-94.0	-91.6	-86.0	FDD
n71	15	+TT	+3 +TT	+3 +TT	+3 +TT	
117 1	30		-94.3	-91.9	-87.4	
	30		+3 +TT	+3 +TT	+3 +TT	
	15	-99.5 ³	-96.3 ³	-94.5 ³	-93.3 ³	FDD
	15	+2.5 +TT	+3 +TT	+3 +TT	+3+TT	
n74	30		-96.6 ³	-94.6 ³	-93.5 ³	
1174	30		+3 +TT	+3 +TT	+3 +TT	
	60		-97.0 ³	-94.9 ³	-93.7 ³	
	00		+3 +TT	+3 +TT	+3+TT	
NOTE 1: V	oid					
NOTE 2: T	he tran	smitter shall b	be set to Pu	JMAX as def	ined in sub	clause
-	.2.4					
		es that the rec				
th	ne assig	ned NR char	nnel bandw	idth is conf	ined within	1475.9-
	510.9 N					
NOTE 4: T	T for ea	ach frequency	and chani	nel bandwi	dth is speci	fied in
Т	able 7.3	31.2.5-7.				

Table 7.3I.2.5-4: Single antenna port reference sensitivity QPSK PREFSENS for TDD bands

-		erating band / SCS / Channel bandwidth / RE	FSENS/Duplex Mode		
Operating band	SCS kHz	Channel bandwidth (MHz)	REFSENS (dBm) ⁸	Duplex Mode	
	15	5, 10, 15	-100 + 10log ₁₀ (N _{RB} /25) +2.5+TT		
n34	30	10, 15	-97.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15	-97.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
	15	5, 10, 15, 20,	-100 + 10log ₁₀ (N _{RB} /25) +2.5+TT		
n381	30	10, 15, 20,	-97.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20	-97.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
	15	5, 10, 15, 20	-100 + 10log ₁₀ (N _{RB} /25) +2.5+TT		
n39	30	10, 15, 20,	-97.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20,	-97.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
	15	5, 10, 15, 20	-100 + 10log ₁₀ (N _{RB} /25) +2.5+TT		
n40	30	10, 15, 20	-97.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20	-97.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
	15	10, 15, 20	-94.8 + 10log ₁₀ (N _{RB} /50) +2.5+TT		
n41 ¹	30	10, 15, 20	-95.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20	-95.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
	15	5, 10, 15, 20,	-99 + 10log ₁₀ (N _{RB} /25) +2.5+TT		
n48 ¹	30	10, 15, 20,	-96.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20,	-96.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
	15	5, 10, 15, 20	-100 + 10log ₁₀ (N _{RB} /25) +2.5+TT		
n50	30	10, 15, 20	-97.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20	-97.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
n51	15	5	-100 +2.5+TT	TDD	
n53	15	5, 10	-100 + 10log ₁₀ (N _{RB} /25) +2.5+TT	TDD	
1100	30 60	<u> </u>	-97.1 +2.5+TT -97.5 +2.5+TT		
	15	10, 15, 20,	-95.3 + 10log10(NRB/50) +2.5+TT		
n77 ^{1,4}	30	10, 15, 20	-95.6 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20	-96.0 + 10log ₁₀ (N _{RB} /11) +2.5+TT		
	15	10, 15, 20	-95.8 + 10log ₁₀ (N _{RB} /50) +2.5+TT		
n78¹	30	10, 15, 20	-96.1 + 10log ₁₀ (N _{RB} /24) +2.5+TT	TDD	
	60	10, 15, 20	-96.5 + 10log ₁₀ (N _{RB} /11) +2.5+TT	1	
n79 ¹	15	10, 20,	-89.6 + 10log ₁₀ (N _{RB} /216) +2.5+TT	TDD	
	•		•	•	

	30	10, 20,	-89.7 + 10log ₁₀ (N _{RB} /106) +2.5+TT					
	60	10, 20	-89.9 + 10log₁₀(N _{RB} /51) +2.5+TT					
NOTE 1:	Void.		· · · · · · · · · · · · · · · · · · ·					
NOTE 2:	The trans	smitter shall be set to PUMAX as defined in clause	6.2.4.					
NOTE 3:	Void							
NOTE 4:	The requ	The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined						
	within 33	300 - 3800 MHz.						
NOTE 5:	Void							
NOTE 6:	Void							
NOTE 7:	Void							
NOTE 8:	The REF	SENS value is rounded to the nearest number d	own to one decimal point. "N _{RB} " in					
	REFSEN	IS formula is the maximum transmission bandwid	th configuration as defined in Table					
	5.3.2-1.		-					
NOTE 9:	TT for ea	ach frequency and channel bandwidth is specified	d in Table 7.3I.2.5-7.					

Table 7.3I.2.5-5: Two antenna port reference sensitivity QPSK PREFSENS for HD-FDD operation

Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
	15	-100.0	-96.8	-95.0	-93.7	HD-
		+TT	+TT	+TT	+TT	FDD
n1	30		-97.2	-95.2	-93.9	
			+TT	+TT	+TT	
	60		-97.5	-95.4	-94.2	
	15	-98.8	+TT	+TT	+TT -92.5	HD-
	15	-90.0 +TT	-95.6 +TT	-93.8 +TT	-92.5 +TT	FDD
	30		-96.0	-94.0	-92.7	100
n2			+TT	+TT	+TT	
	60		-96.3	-94.2	-93.0	
			+TT	+TT	+TT	
	15	-97.8	-94.6	-92.8	-91.5	HD-
	20	+TT	+TT	+TT	+TT	FDD
n3	30		-95.0 +TT	-93.0 +TT	-91.7 +TT	
	60		-95.3	-93.2	-92.0	
			-33.3 +TT	+TT	-52.0 +TT	
	15	-98.8	-95.6	-93.8	-92.5	HD-
n5		+TT	+TT	+TT	+TT	FDD
113	30		-96.0	-94.0	-92.7	
	1.5		+TT	+TT	+TT	
n7	15	-98.8	-95.6	-93.8	-92.5	HD-
	30	+TT	+TT -96.0	+TT -94.0	+TT -92.7	FDD
	30		-96.0 +TT	-94.0 +TT	-92.7 +TT	
	60		-96.3	-94.2	-93.0	
	00		+TT	+TT	+TT	
	15	-97.8	-94.6	-92.8	-91.5	HD-
n8		+TT	+TT	+TT	+TT	FDD
110	30		-95.0	-93.0	-91.7	
	45	07.0	+TT	+TT	+TT	
	15	-97.8 +TT	-94.6 +TT	-92.8 +TT		HD- FDD
n12	30	+11	-95.0	-93.0		гоо
	50		+TT	+TT		
	15	-97.8	-94.6			HD-
n12		+TT	+TT			FDD
n13	30		-95.0			
		c= -	+TT			
	15	-97.8	-94.6			HD-
n14	30	+TT	+TT -95.0			FDD
	50		-95.0 +TT			
	15	-100.0	-96.8	-95.0		HD-
n10		+TT	+TT	+TT		FDD
n18	30		-97.2	-95.2		
			+TT	+TT		
	15	-97.8	-94.6	-92.8	-91.5	HD-
n20	20	+TT	+TT	+TT	+TT	FDD
	30		-95.0 +TT	-93.0 +TT	-91.7 +TT	
	15	-100.0	-96.8	711	711	HD-
		+TT	-30.8 +TT			FDD
-04	30		-97.2			1
n24			+TT			
	60		-97.5			
			+TT			
n25	15	-97.3 +TT	-94.1 +TT	-92.3 +TT	-91.0 +TT	HD- FDD

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Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duple: Mode
	30		-94.5	-92.5	-91.2	
			+TT	+TT	+TT	
	60		-94.8	-92.7	-91.5	
			+TT	+TT	+TT	
	15	-98.3	-95.1	-93.3	-92.0	HD-
n26		+TT	+TT	+TT	+TT	FDD
1120	30		-95.5	-93.5	-92.2	
			+TT	+TT	+TT	
	15	-99.3	-96.1	-94.3	-93.0	HD-
n28		+TT	+TT	+TT	+TT	FDD
1120	30		-96.5	-94.5	-93.2	
			+TT	+TT	+TT	
	15	-99.5	-96.3			HD-
n30		+TT	+TT			FDD
1150	30		-96.7			
			+TT			
	15	-100.0	-	-95.0	-93.7	HD-
		+TT	96.8+TT	+TT	+TT	FDD
n65	30		-97.2	-95.2	-93.9	
1105			+TT	+TT	+TT	
	60		-97.5	-95.4	-94.2	
			+TT	+TT	+TT	
	15	-100.0	-96.8	-95.0	-93.7	HD-
		+TT	+TT	+TT	+TT	FDD
n66	30		-97.2	-95.2	-93.9	
100			+TT	+TT	+TT	
	60		-97.5	-95.4	-94.2	
			+TT	+TT	+TT	
	15	-100.0	-96.8	-95.0	-93.7	HD-
		+TT	+TT	+TT	+TT	FDD
n70	30		-97.2	-95.2	-93.9	
1170			+TT	+TT	+TT	
	60		-97.5	-95.4	-94.2	
			+TT	+TT	+TT	
	15	-98.0	-94.8	-93.0	-91.7	HD-
n71		+TT		+TT	+TT	FDD
	30		-95.2	-93.2	-91.9	
			+TT	+TT	+TT	
	15	-100.0	-96.8	-95.0	-93.7	HD-
		+TT	+TT	+TT	+TT	FDD
n74	30		-97.2	-95.2	-93.9	
			+TT	+TT	+TT	
	60		-97.5	-95.4	-94.2	
			+TT	+TT	+TT	
	15	-97.8	-94.6	-92.8		HD-
n85		+TT	+TT	+TT		FDD
1100	30		-95.0	-93.0		
			+TT	+TT		
NOTE 1: T	he tran	smitter sh	all be set to	р Римах а	s defined	in

Table 7.3I.2.5-6: Single antenna port Reference sensitivity QPSK PREFSENS for HD-FDD operation

Operating I	band / S	SCS / Char	nel bandw	idth/ REFS	ENS / Dup	lex Mode
Operating	SCS	5 MHz	10 MHz	15 MHz	20 MHz	Duplex
Band	kHz	(dBm)	(dBm)	(dBm)	(dBm)	Mode
	15	-97.5	-94.3	-92.5	-91.2	HD-FDD
		+TT	+TT	+TT	+TT	
n1	30		-94.7	-92.7	-91.4	
			+TT	+TT	+TT	
	60		-95.0	-92.9	-91.7	
			+TT	+TT	+TT	
	15	-96.3	-93.1	-91.3	-90.0	HD-FDD
	0.0	+TT	+TT	+TT	+TT	_
n2	30		-93.5	-91.5	-90.2	
	60		+TT -93.8	-91.7	-90.5	_
	00		-93.8 +TT	-91.7 +TT	-90.5 +TT	
	15	-95.3	-92.1	-90.3	-89.0	HD-FDD
	15	-33.3 +TT	+TT	+TT	-03.0 +TT	
	30		-92.5	-90.5	-89.2	
n3	00		+TT	+TT	+TT	
	60		-92.8	-90.7	-89.5	
			+TT	+TT	+TT	
	15	-96.3	-93.1	-91.3	-90.0	HD-FDD
		+TT	+TT	+TT	+TT	
n5	30		-93.5	-91.5	-90.2	]
			+TT	+TT	+TT	
	15	-96.3	-93.1	-91.3	-90.0	HD-FDD
		+TT	+TT	+TT	+TT	
n7	30		-93.5	-91.5	-90.2	
			+TT	+TT	+TT	
	60		-93.8	-91.7	-90.5	
			+TT	+TT	+TT	
	15	-95.3	-92.1	-90.3	-89.0	HD-FDD
n8	0.0	+TT	+TT	+TT	+TT	_
	30		-92.5	-90.5	-89.2	
	15	-95.3	+TT	+TT	+TT	HD-FDD
	15	-95.3 +TT	-92.1 +TT	-90.3 +TT		ם חס-רטט
n12	30	TII	-92.5	-90.5		
	30		-92.5 +TT	-90.5 +TT		
	15	-95.3	-92.1			HD-FDD
	10	+TT	+TT			
n13	30		-92.5			-
	00		+TT			
	15	-95.3	-92.1			HD-FDD
- 4.4	-	+TT	+TT			
n14	30		-92.5			
			+TT			
	15	-97.5	-94.3	-92.5		HD-FDD
n18		+TT	+TT	+TT		
1110	30		-94.7	-92.7		
			+TT	+TT		
	15	-95.3	-92.1	-90.3	-89.0	HD-FDD
n20		+TT	+TT	+TT	+TT	4
	30		-92.5	-90.5	-89.2	
		<b>67</b> -	+TT	+TT	+TT	
	15	-97.5	-94.3			HD-FDD
	0.0	+TT	+TT			-
n24	30		-94.7			
-	00		+TT			4
	60		-95.0			
		04.0	+TT	00.0	00 5	
			-91.6	-89.8	-88.5	HD-FDD
	15	-94.8				
n25	15 30	-94.8 +TT	+TT -92.0	+TT -90.0	+TT -88.7	-

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Operating Band	SCS kHz	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
	60		-92.3	-90.2	-89.0	
			+TT	+TT	+TT	
	15	-95.8	-92.6	-90.8	-89.5	HD-FDD
n26		+TT	+TT	+TT	+TT	
1120	30		-93.0	-91.0	-89.7	
			+TT	+TT	+TT	
	15	-96.8	-93.6	-91.8	-90.5	HD-FDD
n28		+TT	+TT	+TT	+TT	-
1120	30		-94.0	-92.0	-90.7	
			+TT	+TT	+TT	
	15	-97.0	-93.8			HD-FDD
n30		+TT	+TT			_
1100	30		-94.2			
			+TT			
	15	-97.5	-94.3	-92.5	-91.2	HD-FDD
		+TT	+TT	+TT	+TT	
n65	30		-94.7	-92.7	-91.4	
			+TT	+TT	+TT	
	60		-95.0	-92.9	-91.7	
			+TT	+TT	+TT	
	15	-97.5	-94.3	-92.5	-91.2	HD-FDD
		+TT	+TT	+TT	+TT	_
n66	30		-94.7	-92.7	-91.4	
1100			+TT	+TT	+TT	
	60		-95.0	-92.9	-91.7	
			+TT	+TT	+TT	
	15	-97.5	-94.3	-92.5	-91.2	HD-FDD
		+TT	+TT	+TT	+TT	
n70	30		-94.7	-92.7	-91.4	
			+TT	+TT	+TT	-
	60		-95.0	-92.9	-91.7	
			+TT	+TT	+TT	
	15	-95.5	-92.3	-90.5	-89.2	HD-FDD
n71		+TT	+TT	+TT	+TT	-
	30		-92.7	-90.7	-89.4	
	45	07.5	+TT	+TT	+TT	
	15	-97.5	-94.3	-92.5	-91.2	HD-FDD
	0.0	+TT	+TT	+TT	+TT	-
n74	30		-94.7	-92.7	-91.4	
	00		+TT	+TT	+TT	-
	60		-95.0	-92.9	-91.7	
	4-	05.0	+TT	+TT		
	15	-95.3	-92.1	-90.3		HD-FDD
n85		+TT	+TT	+TT		4
1100	30		-92.5	-90.5		
		• • ···	+TT	+TT		
NOTE 1: T	ne trans	mitter shall	De set to P	UMAX as def	ined in clau	ISE 6.2.4.

Table 7.3I.2.5-7: Test Tolerance (TT) for RX sensitivity level for RedCap UE

f ≤ 3.0GHz	3.0GHz < f ≤ 6.0 GHz
0.7 dB	1.0 dB

# 7.4 Maximum input level

# 7.4.1 Test purpose

Maximum input level tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to a g-NodeB.

# 7.4.2 Test applicability

This test applies to all types of NR UE release 15 and forward.

## 7.4.3 Minimum conformance requirements

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel. The throughput shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4.3-1.

Rx Parameter	Units	Channel bandwidth (MHz)				
	KX Farameter Units		25, 30, 35, 40, 45, 50	60, 70, 80, 90, 100		
Power in Transmission Bandwidth Configuration ⁴	dBm	-25 ²	-25 + 10log ₁₀ (BW _{Channel} /20) ^{Note 2}	-20 ²		
		-27 ^{3,5}	$-27 + 10 log_{10} (BW_{Channel} / 20)^{Note 3,5}$	-22 ^{3,5}		
7.3.2-3 v NOTE 2: Reference NOTE 3: Reference NOTE 4: 10log10(2	vith P _{CMAX_} ce measure ce measure x) is rounde	L,f,c as defined in classement channel is A arment channel is A ar	.3.2.3 or A.3.3.3 for 64 QAM. .3.2.4 or A.3.3.4 for 256 QAM.	iguration specified in Table		

### Table 7.4.3-1: Maximum input level

The normative reference for this requirement is TS 38.101-1 [2] clause 7.4.

- 7.4.4 Test description
- 7.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.4.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Initial Conditions						
Test Environment as spec	ified in TS 38.508-1 [5]	Normal				
subclause 4.1						
Test Frequencies as spec	ified in TS 38.508-1 [5]	Mid range (NOTE 5)				
subclause 4.3.1						
Test Channel Bandwidths	as specified in TS	Lowest, Mid, Highest				
38.508-1 [5] subclause 4.	3.1	Lowest UL / Lowest DL, Lo	west UL / Highest DL			
		(NOTE 4)				
Test SCS as specified in	Table 5.3.5-1	Lowest				
	Test Parameters for Channel Bandwidths					
Downlink Co	nfiguration	Uplink Conf	iguration			
Modulation	RB allocation	Modulation	RB allocation			
CP-OFDM 64 QAM	NOTE 1	DFT-s-OFDM QPSK	NOTE 2			
CP-OFDM 256 QAM	NOTE 1	DFT-s-OFDM QPSK	NOTE 2			
NOTE 1: The specific co	nfiguration of downlink RE	3 allocation is defined in Tabl	e 7.3.2.4.1-2.			
NOTE 2: The specific co	nfiguration of uplink RB a	llocation is defined in Table 7	.3.2.4.1-3.			
NOTE 3: In a band when	e UE supports 4Rx, the te	st shall be performed only wi	ith 4Rx antennas ports			
connected.						
NOTE 4: Additional test	points selected according	to asymmetric channel band	widths specified in			
clause 5.3.6. D	L channel bandwidth shal	l be selected first.	-			
NOTE 5: For NR band n	28, 30MHz test channel b	andwidth is tested with Low r	ange test frequencies.			

### Table 7.4.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.4.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.4.4.3.

#### 7.4.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.4.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.4.4.1-1. Since the UE has no payload data and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
- 3. Set the Downlink signal level to the value as defined in Table 7.4.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.4.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.4.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

#### 7.4.5 Test requirement

The throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 with parameters specified in Tables 7.4.5-1.

Rx Parameter	Units	Channel bandwidth (MHz)				
	Onits	5, 10, 15, 20	25, 30, 35, 40, 45, 50	60, 70, 80, 90, 100		
Power in Transmission Bandwidth Configuration ⁴	dBm	-25 ² -TT	-25 + 10log ₁₀ (BW _{Channel} /20) ^{Note 2} -TT	-20 ² -TT		
		-27 ^{3,5} -TT	$-27 + 10 log_{10} (BW_{Channel} / 20)^{Note 3,5} - TT$	-22 ^{3,5} -TT		
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum uplink configuration specified in Table 7.3.2-3 with P_{CMAX_L,f,c} as defined in clause 6.2.4.</li> <li>NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.</li> <li>NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.</li> <li>NOTE 4: 10log₁₀(x) is rounded to the nearest 0.5dB value.</li> <li>NOTE 5: Reference measurement channel is A.3.2.x for 1024 QAM.</li> </ul>						

### Table 7.4.5-1: Maximum input level

### Table 7.4.5-2: Void

f ≤ 3.0GHz	3.0GHz < f ≤6.0GHz
0.7 dB	1.0 dB

# 7.4A Maximum input level for CA

# 7.4A.0 Minimum conformance requirements

# 7.4A.0.1 Maximum input level for Intra-band contiguous CA

For intra-band contiguous carrier aggregation maximum input level is defined as the maximum mean power received at the UE antenna port, over the Transmission bandwidth configuration of each CC.

The throughput shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4A.0.1-1 for each component carrier.

### Table 7.4A.0.1-1: Maximum input level for Intra-band contiguous CA

Rx Parameter	Units	NR CA Bandwidth Class			
		B C D			

Power in largest transmission bandwidth configuration CC, Plargest BW	dBm	-23 ² -25 ³	-23 ² -25 ³	-25 ² -27 ³					
Power in each other CC	dBm	Plargest BW +10*log{(N _{RB,c} *SCS _c )/(N _{RB,largest BW} *SCS _{largest BW} )}							
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum uplink configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} as defined in subclause 6.2.4.3.</li> <li>NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.</li> <li>NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.</li> </ul>									

# 7.4A.0.2 Maximum input level for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the maximum input level requirements are defined with the uplink configuration in accordance with 7.3A.0.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified subclause 7.4.3 and Table 7.4A.0.1-1 for one component carrier and two component carriers per sub-block, respectively. The throughput of each downlink component carrier shall be  $\geq$  95% of the maximum throughput of the specified reference measurement channel as specified in Annex A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1 and A.5.2.1. The requirements apply with all downlink carriers active.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.4A.

# 7.4A.0.3 Maximum input level for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the maximum input level is defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.4.3 for each component carrier while all downlink carriers are active.

The throughput shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) for each component carrier.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.4A.

# 7.4A.1 Maximum input level for CA (2DL CA)

7.4A.1.1 Test purpose

The same test purpose as defined in 7.4.1.

7.4A.1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 2DL CA.

7.4A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0.

7.4A.1.4 Test description

## 7.4A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in table 7.4A.1.4.1-1 or 7.4A.1.4.1-2. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions								
	Environment as specified subclause 4.1	d in TS 38.508-	Normal					
	Frequencies as specified bclause 4.3.1	l in TS 38.508-1	Mid range					
specif	CC Combination setting fied in Table 5.5A.1-1 fo guration across bandwid	the CA	NOTE 1					
	supported by the UE.		1 = t					
Test	SCS as specified in Tabl		Lowest	re				
	Downlin	nk Configuration		Uplink Configuration				
Test	CC	PCC RB	SCC RB	CC	PCC RB			
ID	Mod'n	allocation	allocation	Mod'n	allocation			
1	CP-OFDM 64QAM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1			
2	CP-OFDM 256QAM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1			
<ul> <li>NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3A.1.4.1-1.</li> <li>NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.</li> </ul>								

# Table 7.4A.1.4.1-1: Test configuration table for Intra-band contiguous CA

Default Conditions									
Test E	Invironment as specified	l in TS 38.508-	Normal						
1 [5] s	ubclause 4.1								
	requencies as specified	l in TS 38.508-1	NOTE 1, NOT	E 3					
	oclause 4.3.1								
	C Combination setting		NOTE 1, NOT	E 4					
	ied in Table 5.5A.3.1-1 1								
	juration across bandwid	th combination							
	upported by the UE.		-						
Test S	SCS as specified in Tabl		Lowest						
			Test Parameter						
	Downlin	k Configuration	Uplink Configuration						
Test	CC	PCC RB	SCC RB	CC	PCC RB				
ID	Mod'n	allocation	allocation	Mod'n	allocation				
1	CP-OFDM 64QAM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1				
2	CP-OFDM 256QAM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1				
NOTE				e defined in Table 7.3A.1.4.1					
				re used for maximum input l					
NOTE				performed only with 4Rx ant					
connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.									
				tested with Low range test f					
NOTE				CA Configuration with the sa	ame N _{RB_agg} , only the				
	combination with th	e highest NRB_F	PCC is tested.						

Default Conditions									
Test E	Invironment as specified		Normal						
1 [5] s	ubclause 4.1								
Test F	requencies as specified	l in TS 38.508-1	NOTE 1						
	oclause 4.3.1								
	C Combination setting		NOTE 1, NOT	E 3					
	ied in Table 5.5A.2-1 for								
	juration across bandwid	th combination							
	upported by the UE.								
Test S	SCS as specified in Tabl		Lowest						
Test Parameters									
		nk Configuration		Uplink Configuration					
Test	CC	PCC RB	SCC RB	CC	PCC RB				
ID	Mod'n	allocation	allocation	Mod'n	allocation				
1	CP-OFDM 64QAM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1				
2	CP-OFDM 256QAM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1				
NOTE	E 1: The specific	c configuration of	f uplink and dov	vnlink are defined in Table	7.3A.1.4.1-3. Only				
test po	oints verifying non-exce	ptional REFSEN	S requirements	are used for maximum inpu	t level.				
NOTE	E 2: In a band w	here UE supports	s 4Rx, the test sl	hall be performed only with	4Rx antennas ports				
connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.									
NOTE 3: If the UE supports multiple CC Combinations in the CA Configuration with the same $N_{RB_agg}$ , only the combination with the highest NRB_PCC is tested.									

### Table 7.4A.1.4.1-3: Test configuration table for Intra-band non-contiguous CA

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.4A.1.4.1-1, Table 7.4A.1.4.1-2 or Table 7.4A.1.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.4A.1.4.3.

#### 7.4A.1.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1 and C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.4A.1.4.3.
- 3. SS activates SCC by sending the activation MAC-CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.4A.1.4.1-1 for intra-band contiguous CA, 7.4A.1.4.1-2 for inter-band CA or 7.4A.1.4.1-3 for intra-band non-contiguous CA on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.4A.1.4.1-1 for intra-band contiguous CA, 7.4A.1.4.1-2 for interband CA or 7.4A.1.4.1-3 for intra-band non-contiguous CA. Since the UE has no payload data and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.

- 6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.4A.1.5-1 for intra-band contiguous CA, Table 7.4A.1.5-2 for inter-band CA or Table 7.4A.1.5-3 for intra-band non-contiguous CA. Send uplink power control commands to the UE using 1dB step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.4A.1.5-1 for intra-band contiguous CA, Table 7.4A.1.5-2 for inter-band CA or 7.4A.1.5-3 for intra-band non-contiguous CA for at least the duration of the Throughput measurement ,where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 7. For intra-band contiguous and non-contiguous CA: measure the average throughput of each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.
- For inter-band CA: measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 8. For Inter-band CA only: Repeat steps from 1 to 7 setting the original PCell as SCell and the original SCell as PCell in the corresponding CA configuration, except for operating bands without uplink band.

## 7.4A.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

### 7.4A.1.5 Test requirement

The throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3 with parameters specified in Table 7.4A.1.5-1 for intra-band contiguous CA or Table 7.4A.1.5-2 for inter-band CA.

Rx Parameter	Units	NR CA Bandwidth Class						
		В	CD	E				
Power in largest transmission		-23 ² -TT	-23 ² -TT-25 ² -TT	-26 ² -TT				
bandwidth configuration CC, P _{largest} BW	dBm	-25 ³ -TT	-25 ³ -TT-27 ³ -TT	-28 ³ -TT				
Power in each other CC dBm Plargest BW +10*log{(NRB,c*SCSc)/(NRB,largest BW*SCSla								
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum uplink configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} as defined in subclause 6.2.4.3.</li> <li>NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.</li> <li>NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.</li> <li>NOTE 4: TT for each frequency is specified in Table 7.4A.1.5-5.</li> </ul>								

Rx	Units		Channel bandwidth											
Parameter		5	10	15	20	25	30	40	50	60	70	80	90	100
		MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
Power in			25	²-TT		-24 ² 23 ² 22 ² 21 ² -					-20 ² -TT			
Transmission	dBm		-25			TT	TT	TT	TT			-2011		
Bandwidth	UDITI	073		3-TT		-26 ³ -	-25 ³ -	-24 ³ -	-23 ³ -	-22 ³ -TT				
Configuration			-21	-11		TT	TT	TT	TT	-228-11				
NOTE 1: The	transmit	ter shal	l be set	to 4dB	below	Рсмах_L а	t the mini	mum upli	ink configu	uration s	specifie	d in Tab	ble 7.3.2	2.3-3
with	PCMAX_L	as defi	ned in s	ubclaus	se 6.2.4									
NOTE 2: Reference measurement channel is Annex A.3.2.3/A.3.3.3 for 64-QAM.														
NOTE 3: Refe	NOTE 3: Reference measurement channel is Annex A.3.2.4/A.3.3.4 for 256-QAM.													
NOTE 4: TT f	or each f	frequen	cy is sp	ecified	in Table	e 7.4A.1.8	5-5.							

#### Table 7.4A.1.5-2: Maximum input level for inter-band

### Table 7.4A.1.5-3: Maximum input level for intra-band non-contiguous

Rx	Units													
Parameter		5	10	15	20	25	30	40	50	60	70	80	90	100
		MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
Power in			25	2-TT		-24 ² -	-23 ² -	-22 ² -	-21 ² -	-20 ² -TT				
Transmission	ransmission dBm		-20	-11		TT	TT	TT	TT	-2011				
Bandwidth	UDITI	-27 ³ -TT			-26 ³ -	-25 ³ -	-24 ³ -	-23 ³ -	-22 ³ -TT					
Configuration			-21	-11		TT	TT	TT	TT		-22*-11			
NOTE 1: The	transmit	ter shal	l be set	to 4dB	below	Рсмах_L а	t the mini	mum upli	ink configu	uration s	specifie	d in Tal	ole 7.3.2	2.3-3
with P _{CMAX_L} as defined in subclause 6.2.4.														
NOTE 2: Reference measurement channel is Annex A.3.2.3/A.3.3 for 64-QAM.														
NOTE 3: Reference measurement channel is Annex A.3.2.4/A.3.3.4 for 256-QAM.														
NOTE 4: TT f	or each f	frequen	cy is sp	ecified	in Table	e 7.4A.1.8	5-5.							

# Table 7.4A.1.5-4: Void

f ≤ 3.0GHz	3.0GHz < f ≤6.0GHz				
0.7 dB	1.0 dB				

# 7.4A.2 Maximum input level for CA (3DL CA)

7.4A.2.1 Test purpose

The same test purpose as defined in 7.4.1.

7.4A.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 3DL CA.

7.4A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0.

7.4A.2.4 Test description

#### 7.4A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in table 7.4A.2.4.1-1, 7.4A.2.4.1-2 or 7.4A.2.4.1-3. The details of the uplink and downlink reference measurement channels

(RMC) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

			Default Co	nditions					
		as specified in TS	Normal						
	8-1 [5] subcla		lature le rue de ru						
	-requencies a 18-1 [5] subcla	as specified in TS	Intra-band contiguous: Mid range for PCC and SCCs Inter-band: NOTE 1, NOTE 5						
36.50		1056 4.3.1			r-band: NOTE 1, NOTE 5				
					Inter-band: NOTE 1 with	Wgan for			
					efined in table 7.3A.2.4.1-				
Test 0	CC Combinat	ion setting (N _{RB_agg} ) as	NOTE 1, NO			· · · · ·			
specif	fied in Tables	5.5A.1-1, 5.5A.2-1, or							
		.5A.3.x for the CA							
	guration acros								
		upported by the UE.		00					
	ork signalling	fied in Table 5.3.5-1	NS_01 by de	CC and SCCs					
netwo	ork signalling	value	Test Para						
		Downlink Conf			Uplink Configur	ation			
Test	CC	PCC RB allocation	SCC ₁ RB	SCC ₂ RB	CC	PCC RB			
ID	Mod'n		allocation	allocation	Mod'n	allocation			
	De	fault Test Settings for							
1	CP-	NOTE 1	NC	TE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
2	64QAM CP-	NOTE 1	NO	TE 1	DFT-s-OFDM QPSK	NOTE 1			
2	OFDM	NOTET	NC		DFT-S-OFDIVI QP3K	NOTET			
	256QAM								
-		efault Test Settings for	r a CA_nXA-n	YA-nZA Config	guration (Inter-band)	1			
1	CP-	NOTE 1	NC	TE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
	64QAM								
2	CP-	NOTE 1	NC	TE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM 256QAM								
Defa		ngs for a CA nXC-nYA	A.CA nYA-nX	(C. CA nYA-n)	⊔ (B and CA_nXB-nYA Cor	figurations			
				ous + Inter-band		galatione			
1	CP-	NOTE 1		TE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
_	64QAM	NOTE		<b>TE</b> (		NOTE			
2	CP- OFDM	NOTE 1	NO	TE 1	DFT-s-OFDM QPSK	NOTE 1			
	256QAM								
	20000/100	Default Test Sett	ings for a CA	nX(2A)-nYA (	Configuration				
L		(Intra-ba		guous + Inter-k					
1	CP-	NOTE 1		TE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
-	64QAM								
2	CP- OFDM	NOTE 1		TE 1	DFT-s-OFDM QPSK	NOTE 1			
	256QAM								
NOTE		cific configuration of upl	ink and downli	nk are defined i	n Table 7.3A.2.4.1-1. Only	test points			
	verifying	non-exceptional REFS	ENS requirem	ents are used fo	or maximum input level tes	ting.			
NOTE	2: CA Con	figuration Test CC Com	bination test se	ettings are chec	ked separately for each C	4			
NOT	Configu				Configuration 5 - to 00				
NOTE					Configuration. E.g. for CA ,Y correspond to the differ				
					d non-contiguous + Inte				
					on. E.g. for CA_n1A-n1A-r				
	=8.			-	-				
NOTE					only with 4Rx antennas p				
NOT					is used in the test requiren				
					th Low range test frequend				
		ation with the highest NR			juration with the same $N_{RB}$	agg, only the			
L		alon war ale nighest ND							

# Table 7.4A.2.4.1-1: Test Configuration Table for 3DL CA

### Table 7.4A.2.4.1-2: Void

#### Table7.4A.2.4.1-3: Void

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.4A.2.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.4A.2.4.3.

7.4A.2.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1 and C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.4A.2.4.3.
- 3. SS activates SCC by sending the activation MAC-CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.4A.2.4.1-1 to Table 7.4A.2.4.1-3 as appropriate for PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.4A.2.4.1-1. Since the UE has no payload data and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level for PCC and SCCs to the value as defined in Table 7.4A.2.5-1 and Table 7.4A.2.5-2 according to the type of CA. Send uplink power control commands to the UE using 1dB step size to ensure that the PCC output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.4A.2.5-1 or Table 7.4A.2.5-2 as appropriate for at least the duration of the Throughput measurement ,where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 7. Measure the average throughput for the carrier(s) indicated in table 7.4A.2.4.2-1 for duration sufficient to achieve statistical significance according to Annex H.2A.
- 8. Repeat steps 6 to 7 for all component carriers indicated in Table 7.4A.2.4.2-1.

		•	0				
CA configuration	Test ID (NOTE1)	CA configuration ID in REFSENS	Throughput measured on	Table with test parameters to select			
Intra-band contiguous	1.2	1 ⁵	PCC, SCC ₁ , SCC ₂	Table 7.4A.2.5-1			
Inter-band	1,2	1 ² , 2 ² , 3 ²	SCC1, SCC2	Table 7.4A.2.5-2			
Intra-band	1.0	1 ³	SCC2	Table 7.4A.2.5-2			
contiguous + Inter- band	1,2	2 ³	SCC1, SCC2	Table 7.4A.2.5-1			
Intra-band non-	1.0	14	SCC2	Table 7.4A.2.5-2			
contiguous + Inter- band	1,2	24	SCC1, SCC2	Table 7.4A.2.5-2			
NOTE 2: CA configur in table 7.3A NOTE 3: CA configur and CA_nXI NOTE 4: CA configur	A.2.4.1-11. ation ID as defined in "I B-nYA Configurations (I ation ID as defined in "I	Default Test Settings for a Default Test Settings for a ntra-band contiguous + I Default Test Settings for a	– a CA_nXC-YA, CA_nYA- nter-band)" in table 7.3A	nXC, CA_nYA-nXB .2.4.1-2.			
non-contiguous + Inter-band)" in table 7.3A.2.4.1-1. NOTE 5: CA configuration ID as defined in "Default Test Settings for a CA_nXD Configuration (Intra-band							

# Table 7.4A.2.4.2-1: Test repetition and measurement configuration

7.4A.2.4.3 Message contents

contiguous)" in table 7.3A.2.4.1-1.

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

#### 7.4A.2.5 Test requirement

The throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3 with parameters specified in Table 7.4A.2.5-1 and Table 7.4A.2.5-2 as applicable.

### Table 7.4A.2.5-1: Maximum input level for 3DL CA (Intra-band contiguous)

Rx Parameter	Units		NR CA Ban	dwidth Class				
		В	С	D				
Power in largest transmission		-23 ² -TT	-23 ² -TT	-25 ² -TT				
bandwidth configuration CC, P _{largest BW}	dBm	-25 ³ -TT	-25 ³ -TT	-27 ³ -TT				
		Plargest BW +10*log{(NRB,c*SCSc)/(NRB,largest BW*SCSlargest BW)}						
Power in each other CC	dBm							
NOTE 1:       The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum uplink configuration specified in Table 7.3.2-3 with P _{CMAX_L,f,c} as defined in clause 6.2.4.         NOTE 2:       Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.         NOTE 3:       Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.         NOTE 4:       TT for each frequency is specified in Table 7.4A.2.5-3 for each CC.								

### Table 7.4A.2.5-2: Maximum input level for 3DL CA (Intra-band non-contiguous, Inter-band), per CC

Rx	Units						Chann	Channel bandwidth								
Parameter		5	10	15	20	25	30	40	50	60	70	80	90	100		
		MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz		
Power in						-	-	-	-			-20 ² -TT	•			
Transmission			-25	² -TT		24 ² -	23 ² -	22 ² -	21 ² -							
Bandwidth	dBm					TT	TT	TT	TT							
Configuration	UDIII				-	-	-	-			-22 ³ -TT					
			-27	³ -TT		26 ³ -	25 ³ -	24 ³ -	23 ³ -							
					TT	TT	TT	TT								
NOTE 1: The	transmit	ter shal	ll be set	t to 4 dE	3 below	PCMAX_	_{L,f,c} at th	e minin	num up	link con	figuratio	on spec	ified in ⁻	Table		
7.3.2	7.3.2-3 with PCMAX Ltc as defined in clause 6.2.4.															
NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.																
NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.																
NOTE 4: TT for each frequency is specified in Table 7.4A.2.5-3 for each CC.																

### Table 7.4A.2.5-3: Test Tolerance (Maximum input level), per CC

f ≤ 3.0GHz	3.0GHz < f ≤6.0GHz
0.7 dB	1.0 dB

# 7.4A.3 Maximum input level for CA (4DL CA)

7.4A.3.1 Test purpose

The same test purpose as defined in 7.4.1.

7.4A.3.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 4DL CA.

7.4A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0.

7.4A.3.4 Test description

7.4A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in table 7.4A.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.4A.3.4.1-1: Test Configuration Table for 4DL CA

			Defa	ault Conditio	ns		
			Normal				
TS 38.508-1 [5] subclause 4.1							
		as specified in	NOTE 1				
	3.508-1 [5] st CC Combina	ubclause 4.3.1	NOTE 1, NO				
		ecified in Tables	NOTE I, NO	JIE 5			
		, or tables in					
clause	es 5.5A.3.x f	or the CA					
		oss bandwidth					
COMD	ination sets :	supported by the					
-	SCS as spec	ified in Table	Lowest for F	PCC and SCC	.s		
5.3.5-			Lowootron				
	ork signalling	y value	NS_01 by d	lefault			
	•			st Parameter	S		
_			nk Configura			Uplink Config	
Test ID	CC Mod'n	PCC RB allocation	SCC1 RB allocation	SCC2 RB allocation	SCC3 RB allocation	CC Mod'n	PCC RB allocation
שו						band contiguous)	anocation
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM					QPSK	
	64QAM						
2	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM 256QAM					QPSK	
		Default Test Settin	ngs for a CA	nXA-nYA-nZ	A Configura	tion (Inter-band)	
1	CP-	NOTE 1		NOTE 1	, coonigara	DFT-s-OFDM	NOTE 1
	OFDM					QPSK	
	64QAM						
2	CP- OFDM	NOTE 1		NOTE 1		DFT-s-OFDM QPSK	NOTE 1
	256QAM					QFOR	
		ult Test Settings fo	or a CA_nXC-	nYA-nZA and	CA_nXB-nY	A-nZA Configurations	; ;
	<u>.                                    </u>		(Intra-band o	contiguous + I	nter-band)		
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM 640AM					QPSK	
2	64QAM CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
-	OFDM					QPSK	
	256QAM						
		Default Test S		a CA_nX(2A) [,] n-contiguous			
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM					QPSK	
	64QAM						
2	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM 256QAM		QPSK				
		Default Test	Settings for	a CA_nX(2A	)-nY(2A) Cor	figuration	
		(Intra-bar		uous + Intrab		iguous)	
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM					QPSK	
2	64QAM CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
<b>∠</b>	OFDM	NUTET		NUTET		QPSK	NULEI
	256QAM						
							•

NOTE 1:	The specific configuration of uplink and downlink are defined in Table 7.3A.3.4.1-1. Only test points verifying non-exceptional REFSENS requirements are used for maximum input level testing.
NOTE 2:	CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
NOTE 3:	<b>Inter-band:</b> X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n3A-n8A, X=1, Y=3, Z=8; <b>Intra-band contiguous + Inter-band:</b> X,Y correspond to the different bands in the CA Configuration, e.g. for CA_1C-3A, X=1,Y=3; <b>Intra-band non-contiguous + Inter-band:</b> X and Y correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n1A-n8A, X=1, Y =8.
NOTE 4:	In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.
NOTE 5:	If the UE supports multiple CC Combinations in the CA Configuration with the same N _{RB_agg} , only the combination with the highest NRB_PCC is tested.

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.4A.3.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.4A.3.4.3.

#### 7.4A.3.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1 and C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.4A.2.4.3.
- 3. SS activates SCC by sending the activation MAC-CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.4A.3.4.1-1 as appropriate for PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.4A.3.4.1-1. Since the UE has no payload data and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level for PCC and SCCs to the value as defined in Table 7.4A.3.5-1 and Table 7.4A.3.5-2 according to the type of CA. Send uplink power control commands to the UE using 1dB step size to ensure that the PCC output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.4A.3.5-1 or Table 7.4A.3.5-2 as appropriate for at least the duration of the Throughput measurement ,where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 7. Measure the average throughput for the component carrier(s) indicated in table 7.4A.3.4.2-1 for duration sufficient to achieve statistical significance according to Annex H.2A.

8. Repeat steps 6 to 7 for all component carriers indicated in Table 7.4A.3.4.2-1.

CA configuration	Test ID (NOTE1)	CA configuration ID in REFSENS	Throughput measured on	Table with test parameters to select
Intra-band contiguous	1.2	1 ⁵	PCC,SCC1, SCC2, SCC3	Table 7.4A.3.5-1
Inter-band	1,2	1 ² , 2 ² , 3 ²	SCC1, SCC2, SCC3	Table 7.4A5-2
Intra-band		1 ³	SCC2, SCC3	Table 7.4A5-2
contiguous + Inter- band	1,2,3	2 ³	SCC1, SCC2, SCC3	Table 7.4A.3.5-1
		3 ³	SCC1, SCC2, SCC3	Table 7.4A.3.5-1
Intra-band non-		14	SCC2, SCC3	Table 7.4A.3.5-2
contiguous + Inter- band	1,2,3	2 ⁴	SCC1, SCC2, SCC3	Table 7.4A.3.5-2
		34	SCC1, SCC2, SCC3	Table 7.4A.3.5-2
Intra-band non-	4.0	1	SCC2, SCC3	Table 7.4A.3.5-2
contiguous + Intra- band non-contiguous	1,2	2	SCC2, SCC3	Table 7.4A.3.5-2

### Table 7.4A.3.4.2-1: Test repetition and measurement configuration

NOTE 1: Refers to Test IDs in Table 7.4A.2.4.1-1

NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA-nVA Configuration (Interband)" in table 7.3A.2.4.1-1.

NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_XC-YA-ZA and CA_XB-YA-ZA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.

NOTE 4: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA-ZA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.

NOTE 5: CA configuration ID as defined in "Default Test Settings for a CA_nXE Configuration (Intra-band contiguous)" in table 7.3A.2.4.1-1.

NOTE 6: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nY(2A) Configuration (Intra-band non-contiguous + Intra-band non-contiguous)" in table 7.3A.2.4.1-1.

## 7.4A.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

## 7.4A.3.5 Test requirement

The throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3 with parameters specified in Table 7.4A.3.5-1 and Table 7.4A.3.5-2 as applicable.

Rx Parameter	Units		NR CA Ban	dwidth Class				
		В	С	D				
Power in largest transmission		-23 ² -TT	-23 ² -TT	-25 ² -TT				
bandwidth configuration CC, P _{largest BW}	dBm	-25 ³ -TT	-25 ³ -TT	-27 ³ -TT				
Plargest BW +10*log{(NRB,c*SCSc)/(NRB,largest BW*SCSlargest Power in each other CC dBm								
NOTE 1:       The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum uplink configuration specified in Table 7.3.2-3 with P _{CMAX_L,f,c} as defined in clause 6.2.4.         NOTE 2:       Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.         NOTE 3:       Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.         NOTE 4:       TT for each frequency is specified in Table 7.4A.3.5-3 for each CC.								

Rx	Units		Channel bandwidth											
Parameter		5	10	15	20	25	30	40	50	60	70	80	90	100
		MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
Power in						-	-	-	-			-20 ² -TT	-	
Transmission			-25 ² -TT			24 ² -	23 ² -	22 ² -	21 ² -					
Bandwidth	dDm				TT	TT	TT	TT						
Configuration	dBm				-	-	-	-			-22 ³ -TT			
-			-27	³ -TT		26 ³ -	25 ³ -	24 ³ -	23 ³ -					
						TT	TT	TT	TT					
NOTE 1: The	transmit	ter sha	ll be set	to 4 dE	3 below	PCMAX_	L,f,c at th	ie minin	num up	link con	figuratio	on spec	ified in	Table
7.3.2-3 with P _{CMAX Life} as defined in clause 6.2.4.														
NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.														
NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.														
NOTE 4: TT for each frequency is specified in Table 7.4A.3.5-3 for each CC.														

#### Table 7.4A.3.5-2: Maximum input level for 4DL CA (Intra-band non-contiguous, Inter-band), per CC

Table 7 44 3 5-3. Test Toleran	ce (Maximum input level), per CC
Table 1.4A.3.3-3. Test Tolerall	ce (maximum mput ievei), per co

f ≤ 3.0GHz	3.0GHz < f ≤6.0GHz
0.7 dB	1.0 dB

# 7.4B Maximum input level for NR-DC

For inter-band NR-DC configurations, the maximum input level for the corresponding inter-band CA configuration as specified in clause 7.4A applies.

Note: For NR-DC testing, replace CA by NR-DC, PCC by PCell, and SCC by PSCell in clause 7.4A.

# 7.4D Maximum input level for UL MIMO

## 7.4D.1 Test purpose

Maximum input level tests the ability of UE that supports UL MIMO to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4D.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

#### 7.4D.3 Minimum conformance requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing, the minimum requirements specified in sub-clause 7.4 shall be met with the UL MIMO configurations described in sub-clause 6.2D.1. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.4D and 7.4.

- 7.4D.4 Test description
- 7.4D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.4D.4.1-1. The details of the uplink and downlink reference

measurement channels (RMCs) are specified in Annex A.2 and Annex A.3 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Parameters for Channel Bandwidths					
Uplink Configuration					
ation					
2					
2					
NOTE 1: The specific configuration of downlink RB allocation is defined in Table 7.3.2.4.1-2.					
NOTE 2: The specific configuration of uplink RB allocation is defined in Table 7.3.2.4.1-3.					
NOTE 3: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports					
connected.					

#### Table 7.4D.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A Figure A.3.1.1.2 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and DL Reference Measurement Channel is set according to Table 7.4D.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.4D.4.3.

#### 7.4D.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.4D.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.4D.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. The PDCCH DCI format 0_1 is specified with condition 2TX_UL_MIMO in 38.508-1 [5] subclause 4.3.6.1.1.2
- 3. Set the Downlink signal level to the value defined in Table 7.4D.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.4D.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.

- 4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### Table 7.4D.4-2-1: Void

#### 7.4D.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO

#### 7.4D.5 Test requirement

The throughput shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A3.3 with parameters specified in Table 7.4D.5-1.

Rx Parameter	Units	Channel bandwidth (MHz)				
	Units	5, 10, 15, 20	25, 30, 40, 45, 50	60, 70, 80, 90, 100		
Power in Transmission Bandwidth Configuration ⁴	dBm	-25 ² -TT	-25 + 10log ₁₀ (BW _{Channel} /20) ^{Note 2} -TT	-20 ² -TT		
		-27 ^{3,5} -TT	-27 + 10log ₁₀ (BW _{Channel} /20) ^{Note 3,5} -TT	-22 ^{3,5} -TT		
NOTE 1: The transmitter shall be set to 4 dB below PCMAX_L, c at the minimum uplink configuration specified in Table 7.3.2-3						
with P _{CMAX_L,f,c} as defined in clause 6.2.4.						
NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.						
NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.						
NOTE 4: Power in transmission bandwidth configuration value is rounded to the nearest 0.5dB value.						
NOTE 5: Reference measurement channel is A.3.2.x for 1024 QAM.						
NOTE 6: TT for each frequency is specified in Table 7.4D.5-2						

#### Table 7.4D.5-2: Test Tolerance (Maximum input level)

f ≤ 3.0GHz	3.0GHz < f ≤6.0GHz
0.7 dB	1.0 dB

# 7.5 Adjacent channel selectivity

#### 7.5.1 Test purpose

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

7.5.2 Test applicability

This test applies to all types of NR UE release 15 and forward.

#### 7.5.3 Minimum conformance requirements

The UE shall fulfil the minimum requirements specified in Table 7.5.3-1 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and the minimum requirements specified in Table 7.5.3-2. for NR bands with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz. These requirements apply for all values of an adjacent channel interferer up to -25 dBm and

for any SCS specified for the channel bandwidth of the wanted signal. However, it is not possible to directly measure the ACS; instead the lower and upper range of test parameters are chosen as in Table 7.5.3-3 and Table 7.5.3-4 for verification of the requirements specified in Table 7.5.3-1 and as in Table 7.5.3-5, and Table 7.5.3-6 for verification of the requirements specified in Table 7.5.3-2. For these test parameters, the throughput shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3(with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5). For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.5.3-1: ACS for NR bands with  $F_{DL_{high}} < 2700$  MHz and  $F_{UL_{high}} < 2700$  MHz

RX	Units	Channel bandwidth (MHz)				
parameter	Units	5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100		
ACS	dB	33 30 27 - 10log ₁₀ (BW _{Channel} /20)				
NOTE1: AC	S value is	s rounded to the next higher 0.5dB value				

RX	Units	Channel bandwidth (MHz)		
parameter	Units	10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100		
ACS	dB	33		

Table 7.5.3-3: Test parameters for NR bands with F_{DL_high} < 2700 MHz and F_{UL_high} < 2700 MHz, case 1

RX parameter Units		Channel bandwidth (MHz)				
		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100		
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
Pinterferer ⁴	dBm	REFSENS + 45.5 dB	REFSENS + 42.5 dB	REFSENS + 39.5 – 10log10(BW _{Channel} /20)		
BW _{interferer} MHz		5				
F _{interferer} (offset)	MHz	BW _{Channel} /2 + 2.5 / -(BW _{Channel} /2 + 2.5)				
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: The absolute value of the interferer offset F_{interferer} (offset) shall be further adjusted to ([ F_{interferer} /SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz.</li> </ul>						
The interferer is an NR signal with 15 kHz SCS. NOTE 3: The interferer consists of the NR interferer RMC specified in Annexes A.3.2.2 and A.3.3.2 with sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.				he DL-signal as described in Annex		
NOTE 4: 10log ₁₀ (x) is rounded to the next higher 0.5dB value.						

### Table 7.5.3-4: Test parameters for NR bands with $F_{DL_{high}}$ < 2700 MHz and $F_{UL_{high}}$ < 2700 MHz, case 2

RX parameter	Units		Chan	nel bandwidth (MHz)			
		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
Power in transmission bandwidth configuration ⁴	dBm	-56.5	-53.5	-50.5 + 10log10(BW _{Channel} /20)			
Pinterferer	dBm			-25			
BWinterferer	MHz		5				
F _{interferer} (offset)	MHz	BW _{Channel} /2 + 2.5 / -(BW _{Channel} /2 + 2.5)					
<ul> <li>NOTE 1: The transmitter shall be set to 24 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: The absolute value of the interferer offset F_{interferer} (offset) shall be further adjusted to ([F_{interferer}]/SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz.</li> </ul>							
The interferer is an NR signal with 15 kHz SCS. NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5. NOTE 4: 10log ₁₀ (x) is rounded to the next higher 0.5dB value.							

### Table 7.5.3-5: Test parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 1

RX parameter	Units	Channel bandwidth (MHz)			
		10, 15, 20, 25, 30, <u>35,</u> 40, 45, 50, 60, 70, 80, 90, 100			
Power in					
transmission	dBm	REFSENS + 14 dB			
bandwidth	dbiii				
configuration					
Pinterferer	dBm	REFSENS + 45.5 dB			
BWinterferer	MHz	BW _{Channel}			
		BW _{Channel}			
Finterferer (offset)	et) MHz	/			
		-BW _{Channel}			
NOTE 1: The tra	ansmitter sh	nall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in			
		th P _{CMAX_L,f,c} defined in clause 6.2.4.			
		e of the interferer offset Finterferer (offset) shall be further adjusted to			
$ F_{\text{inter}} $	$_{erer}   SCS  + 0.5 SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.				
	interferer is an NR signal with an SCS equal to that of the wanted signal.				
		sists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided			
dynam	nic OCNG P	attern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.			

RX parameter	Units	Channel bandwidth (MHz)					
-		10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100					
Power in							
transmission	dBm	-56.5					
bandwidth	UDIT						
configuration							
Pinterferer	dBm	-25					
BWinterferer	MHz	BWChannel					
		BW _{Channel}					
Finterferer (offset)	MHz	/					
		-BWChannel					
NOTE 1: The tra	ansmitter sh	all be set to 24 dB below PCMAX_L,f,c at the minimum UL configuration specified in					
		th P _{CMAX_L,f,c} defined in clause 6.2.4.					
	NOTE 2: The absolute value of the interferer offset F _{interferer} (offset) shall be further adjusted to						
$  F_{\text{inter}}  $	$_{\rm ferer}   / SCS  $	+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz.					
The interferer is an NR signal with an SCS equal to that of the wanted signal.							
		sists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided					
dynam	nic OCNG P	attern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.					

### Table 7.5.3-6: Test parameters for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 2

The normative reference for this requirement is TS 38.101-1 [2] clause 7.5.

7.5.4 Test description

7.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.5.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

### Table 7.5.4.1-1: Test Configuration Table

	Default Conditions						
	onment as specified in T 5] subclause 4.1	S	Normal				
38.508-1 [	uencies as specified in TS 5] subclause 4.3.1		Mid range (N	Mid range (NOTE 4)			
	nel Bandwidths as speci -1 [5] subclause 4.3.1	fied in	Lowest, Mid, Highest Lowest UL / Lowest DL, Lowest UL / Highest DL (NOTE 3)				
Test SCS	as specified in Table 5.3	.5-1	Lowest				
		Т	est Parameter	S			
	Downlink Co	onfigura	ition	Uplink Config	guration		
Test ID	Mod'n	RB	allocation	Mod'n	<b>RB</b> allocation		
1	CP-OFDM QPSK	1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1		
NOTE 1:	The specific configuration	on of upl	ink and downlin	nk are defined in Table 7.	3.2.4.1-1.		
	NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.						
	OTE 3: Additional test points selected according to asymmetric channel bandwidths specified in clause 5.3.6. DL channel bandwidth shall be selected first.						
	For NR band n28, 30MHz test channel bandwidth is tested with Low range test frequencies.						

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.1 for TE diagram and section A.3.2 for UE diagram.

- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.5.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.5.4.3.

7.5.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.5.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.5.4.1-1. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 3. Set the Downlink signal level to the value as defined in Table 7.5.5-2 or Table 7.5.5-5 as appropriate (Case 1). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5.5-2 or Table 7.5.5-5 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.3-1.
- 4. Set the Interferer signal level to the value as defined in Table 7.5.5-2 or Table 7.5.5-5 as appropriate (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
- 6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 4.
- 7. Set the Downlink signal level to the value as defined in Table 7.5.5-3 or Table 7.5.5-6 as appropriate (Case 2). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5.5-3 or Table 7.5.5-6 for at least the duration of the Throughput measurement, where MU and Uplink power control window size are defined above.
- 8. Set the Interferer signal level to the value as defined in Table 7.5.5-3 or Table 7.5.5-6 as appropriate (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 9. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
- 10. Repeat steps from 7 to 9, using an interfering signal above the wanted signal in Case 2 at step 8.
- 11. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

### 7.5.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

#### 7.5.5 Test requirement

For NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5.5-2 and 7.5.5-3.

able 7.5.5-1: ACS for NR bands with $F_{DL_{high}}$ < 2700 MHz and $F_{UL_{high}}$ < 2700 MHz
-----------------------------------------------------------------------------------------------

RX	Units	Channel bandwidth (MHz)		Channel bandwidth (MHz)		
parameter	Units	5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100		
ACS	dB	33 30 27 - 10log ₁₀ (BW _{Channel} /20)		27 – 10log ₁₀ (BW _{Channel} /20)		
NOTE1: AC	NOTE1: ACS value is rounded to the next higher 0.5dB value					

RX parameter	Units	Channel bandwidth (MHz)					
•		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
Power in transmission bandwidth	dBm	REFSENS + 14 dB					
configuration							
Pinterferer ⁴	dBm	REFSENS + 45.5 dB         REFSENS + 42.5 dB         REFSENS + 39.5 - 10log1		REFSENS + 39.5 – 10log10(BW _{Channel} /20)			
BWinterferer	MHz	5					
F _{interferer} (offset)	MHz	BW _{Channel} /2 + 2.5 / -(BW _{Channel} /2 + 2.5)					
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: The absolute value of the interferer offset F_{interferer} (offset) shall be further adjusted to ([F_{interferer}]/SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz.</li> </ul>				2.4. offset) shall be further adjusted to			
NOTE 3: The interferer con sided dynamic OC A.5.1.1/A.5.2.1.		n NR signal with 15 kHz SCS. sists of the NR interferer RMC specified in Annexes A.3.2.2 and A.3.3.2 with one CNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex ded to the next higher 0.5dB value.					

RX parameter	Units	Channel bandwidth (MHz)		
		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100
Power in transmission bandwidth configuration ⁴	dBm	-56.5 -53.5 -50.5 + 10log ₁₀ (BW _{Channel} /20)		-50.5 + 10log ₁₀ (BW _{Channel} /20)
Pinterferer	dBm			-25
BWinterferer	MHz			5
F _{interferer} (offset)	MHz	BW _{Channel} /2 + 2.5 / -(BW _{Channel} /2 + 2.5)		
NOTE 1: The transmitter shall be set to 24 dB below $P_{CMAX_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2.3-3 with $P_{CMAX_L,f,c}$ defined in clause 6.2.4. NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $([F_{interferer}]/SCS]+0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.				
The interferer is an NR signal with 15 kHz SCS. NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 NOTE 4: 10log ₁₀ (x) is rounded to the next higher 0.5dB value.				

For NR bands with  $F_{DL_high} \ge 3300$  MHz and  $F_{UL_high} \ge 3300$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in [Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1)] with parameters specified in Tables 7.5.5-5 and 7.5.5-6.

Table 7.5.5-4: ACS for NR bands with  $F_{DL_low} \geq 3300 \text{ MHz}$  and  $F_{UL_low} \geq 3300 \text{ MHz}$ 

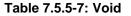
RX parameter	Units	Channel bandwidth (MHz)	
	Units	10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	
ACS	dB	33	

RX parameter	Units	Channel bandwidth (MHz)		
_		10, 15, 20, 25, 30, <u>35</u> , 40, 45, 50, 60, 70, 80, 90, 100		
Power in transmission	dBm	REFSENS + 14 dB		
bandwidth configuration	UDIII	KEFSENS T 14 UB		
Pinterferer	dBm	REFSENS + 45.5 dB		
BWinterferer	rer MHz BW _{Channel}			
F _{interferer} (offset)	MHz	BW _{Channel}		
		-BW _{Channel}		
NOTE 1: The tra	ansmitter sh	nall be set to 4 dB below PCMAX_L,f,c at the minimum UL configuration specified in		
Table 7.3.2.3-3 with $P_{CMAX_L,f,c}$ defined in clause 6.2.4. NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $([F_{interferer}]/SCS]+0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.				
The interferer is an NR signal with an SCS equal to that of the wanted signal. NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.				

RX parameter	Units	Channel bandwidth (MHz)			
-		10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
Power in transmission bandwidth configuration	dBm	-56.5			
Pinterferer	dBm	-25			
BWinterferer	MHz	BW _{Channel}			
F _{interferer} (offset)	MHz	BW _{Channel} / -BW _{Channel}			
Table NOTE 2: The	<ul> <li>NOTE 1: The transmitter shall be set to 24 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified i Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: The absolute value of the interferer offset F_{interferer} (offset) shall be further adjusted to ([ F_{interferer} /SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz.     </li> </ul>				
NOTE 3: The i	nterferer con	an NR signal with an SCS equal to that of the wanted signal. onsists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.			

#### Table 7.5.5-6: Test parameters for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 2

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### 7.5A Adjacent channel selectivity for CA

### 7.5A.0 Minimum conformance requirements

### 7.5A.0.1 Adjacent channel selectivity for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. The UE shall fulfil the minimum requirement specified in Table 7.5A.0.1-1 and 7.5A.0.1-1a for an adjacent channel interferer on either side of the aggregated downlink signal at a specified frequency offset and for an interferer power up to -25 dBm.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.0.1-2, 7.5A.0.1-2a, 7.5A.0.1-3 and 7.5A.0.1-3a.

### Table 7.5A.0.1-1: ACS for intra-band contiguous CA with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz

		CA Bandwidth Class			
Rx Parameter	Units	B C D			
ACS	dB	26.0	33.0	25.2	

### Table 7.5A.0.1-1a: ACS for intra-band contiguous CA with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz

		CA Bandwidth Class		
Rx Parameter	Units	В	С	
ACS	dB	20.0	17.0	

### Table 7.5A.0.1-2: Test parameters for intra-band contiguous CA with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 1

Rx Parameter	Units	CA Bandwidth Class				
		В	C	D		
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB		
PInterferer	dBm	Aggregated power + 24.5 dB	Aggregated power + 31.5 dB	Aggregated power + 23.7 dB		
BWInterferer	MHz	20	BW _{channel} CA	50		
FInterferer (offset)	MHz	10 + F _{offset}	BW _{channel} CA	25 + F _{offset}		
		/	/	/		
		-10 -F _{offset}	-BW _{channel} CA	-25 -F _{offset}		
NOTE 1:       The transmitter shall be set to 4 dB below P _{CMAX_Lf,c} at the minimum UL configuration specified in Table 7.3.2-3 with P _{CMAX_Lf,c} defined in clause 6.2.4.         NOTE 2:       The absolute value of the interferer offset F _{interferer} (offset) shall be further adjusted to						
$( F_{interferer} /SCS +0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal. NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic						
		FDD/TDD for the DL-signal				

# Table 7.5A.0.1-2a: Test parameters for intra-band contiguous CA with $F_{DL_low}{<}2700$ MHz and $F_{UL_low}{<}2700$ MHz, case 1

Rx Parameter	Units	CA Band	CA Bandwidth Class			
		В	С			
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB	REFSENS + 14 dB			
PInterferer	dBm	Aggregated power + 18.5dB	Aggregated power + 15.5dB			
BWInterferer	MHz	5	5			
FInterferer (offset)	MHz	2.5 + F _{offset}	2.5 + F _{offset}			
		/	/			
	-2.5 - F _{offset} -2.5 - F _o					
	OTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2-					
3 with P _{CMAX_L,f,c} defined in claus	3 with P _{CMAX_L,f,c} defined in clause 6.2.4.					
NOTE 2: The absolute value of the interfe	TE 2: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to					
$\left(  F_{\text{interferer}}  / SCS  + 0.5 \right) SCS \text{ MH}$	$\left(\left F_{\text{interferer}}\right  / SCS \right  + 0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NP signal with an SCS equal to that of the wanted signal					
is all INK signal with all 505 eq	is an MK signal with an 303 equal to that of the wanted signal.					
	The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG					
Pattern OP.1 FDD/TDD for the I	DL-signal as described ir	n Annex A.5.1.1/A.5.2.1.				

## Table 7.5A.0.1-3: Test parameters for intra-band contiguous CA with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 2

Rx Parameter	Units	CA Bandwidth Class			
		В	С	D	
Pw in Transmission Bandwidth Configuration, per CC	dBm	-49.5 + 10log(Nrв,c/Nrв_agg)	-56.5	-48.7 + 10log(N _{RB,c} /N _{RB_agg} )	
PInterferer	dBm	-25	-25	-25	
BWInterferer	MHz	20	BW _{channel} CA	50	
FInterferer (offset)	MHz	10 + F _{offset}		25 + Foffset	
		-10 -F _{offset}	/ -BW _{channel CA}	-25 -F _{offset}	
NOTE 1: The transmitter shall be set to 24 dB below $P_{CMAX_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX_L,f,c}$ defined in clause 6.2.4. NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $([F_{interferer} /SCS]+0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal					
interferer is an NR signal with an SCS equal to that of the wanted signal. NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.					

### Table 7.5A.0.1-3a: Test parameters for intra-band contiguous CA with $F_{DL_low}{<}2700$ MHz and $F_{UL_low}{<}2700$ MHz, case 2

Rx Parameter	Units	CA Bandwidth Class			
		В	С		
Pw in Transmission Bandwidth Configuration, per CC	dBm	-43.5+ 10log(N _{RB,c} /N _{RB_agg} )	-40.5+ 10log(N _{RB,c} /N _{RB_agg} )		
PInterferer	dBm	-25	-25		
BWInterferer	MHz	5	5		
FInterferer (offset)	MHz	2.5+ F _{offset}	2.5+ F _{offset}		
		/	/		
		-2.5- Foffset	-2.5- F _{offset}		
NOTE 1: The transmitter shall be s	set to 24 dB I	below P _{CMAX_L,f,c} at the minimum	UL configuration specified in		
Table 7.3.2-3 with PCMAX_L,f,c defined in clause 6.2.4.					
NOTE 2: The absolute value of the interferer offset $F_{\text{interferer}}$ (offset) shall be further adjusted to $([F_{\text{interferer}}   SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.					
The interferer is an NR signal with an SCS equal to that of the wanted signal. NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.					

### 7.5A.0.2 Adjacent channel selectivity Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with  $F_{DL_low} < 2700$  MHz and  $F_{UL_low} < 2700$  MHz with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the adjacent channel selectivity requirements are defined with the uplink configuration in accordance with Table 7.3A.0.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclauses 7.5.3 and 7.5A.0.1 for one component carrier and two component carriers per sub-block, respectively. The UE shall fulfil the minimum requirements all values of a single adjacent channel interferer in-gap and out-of-gap up to a -25 dBm interferer power while all downlink carriers are active. For the lower range of test parameters (Case 1), the interferer power P_{interferer} shall be set to the maximum of the levels given by the carriers of the respective sub-block, respectively. The wanted signal power levels for the carriers of each sub-block shall then be adjusted relative to P_{interferer} in accordance with the ACS requirement for each sub-block (Table 7.5.3-1 and Table 7.5A.0.1-1a). For the upper range of test parameters (Case 2) for which the interferer power P_{interferer} is -25 dBm (Table 7.5.3-4 and Table 7.5A.0.1-3a) the wanted signal power levels for the carriers of each sub-block shall be adjusted relative to P_{interferer} like for Case 1.

For intra-band non-contiguous carrier aggregation with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the adjacent channel selectivity requirements are defined with the uplink configuration in accordance with Table 7.3A.0.2.2-1. For this uplink

configuration, the UE shall meet the requirements for each sub-block as specified in subclauses 7.5.3 and 7.5A.0.1 for one component carrier and two component carriers per sub-block, respectively. The UE shall fulfil the minimum requirements all values of a single adjacent channel interferer in-gap and out-of-gap up to a -25 dBm interferer power while all downlink carriers are active. For the lower range of test parameters (Case 1), the interferer power P_{interferer} shall be set to the maximum of the levels given by the carriers of the respective sub-blocks as specified in Table 7.5.3-3 and Table 7.5A.0.1-2 for one component carrier and two component carriers per sub-block, respectively. The wanted signal power levels for the carriers of each sub-block shall then be adjusted relative to P_{interferer} in accordance with the ACS requirement for each sub-block (Table 7.5.3-1 and Table 7.5A.0.1-1). For the upper range of test parameters (Case 2) for which the interferer power P_{interferer} is -25 dBm (Table 7.5.3 and Table 7.5A.0.1-3) the wanted signal power levels for the carriers of each sub-block relative to P_{interferer} like for Case 1.

The throughput of each carrier shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.5A.0.3 Adjacent channel selectivity Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the adjacent channel requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. For NR CA configurations including an operating band without uplink operation or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The UE shall meet the requirements specified in subclause 7.5.3 for each component carrier while all downlink carriers are active.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.5A.1 Adjacent channel selectivity for CA (2DL CA)

### 7.5A.1.1 Test Purpose

Adjacent channel selectivity for 2DL CA verifies the receiver's ability to receive a wanted 2DL carrier aggregated at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel.

### 7.5A.1.2 Test Applicability

This test case applies to all types of NR UE release 15 and forward that support 2DL CA.

### 7.5A.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.5A.0.

- 7.5A.1.4 Test Description
- 7.5A.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configuration specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.5A.1.4.1-1, Table 7.5A.1.4.1-2 or Table 7.5A.1.4.1-3. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

	Default Conditions						
Test Enviro	onment as specifie	ed in TS	Normal				
38.508-1 [	5] subclause 4.1						
Test Frequ	encies as specifie	d in TS	Mid range				
38.508-1 [	5] subclause 4.3.1						
	ombination setting		Lowest N _{RB_a}	_{gg} , Highest N _{RB_agg}			
	n Table 5.5A.1-1 fo		NOTE 3				
U U	ion across bandwi						
	combination sets supported by the UE.						
Test SCS	Test SCS as specified in Table 5.3.5-1						
	Test Parameters						
	Downli	nk Configura	tion	Uplink Config	guration		
Test ID	CC	PCC RB	SCC RB	CC	PCC RB		
	Mod'n	allocation	allocation	Mod'n	allocation		
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1		
NOTE 1:	The specific config	guration of upl	ink and downlir	nk are defined in Table 7.	3A.1.4.1-1.		
				all be performed only with			
				ent (Table 7.3.2.5-2) is us			
	requirements.		·	. ,			
NOTE 3:	If the UE supports	multiple CC 0	Combinations in	n the CA Configuration wi	th the same		
	NRB_agg, only the	e combination	with the highest	st NRB_PCC is tested			

### Table 7.5A.1.4.1-1: Test Configuration Table for intra-band contiguous 2DL CA

### Table 7.5A.1.4.1-2: Test Configuration Table for inter-band 2DL CA

		De	fault Conditio	ns	
Test Envi	ronment as specifie	ed in TS	Normal		
38.508-1	38.508-1 [5] subclause 4.1				
	uencies as specifie	d in TS	NOTE 1, NO	TE 3	
38.508-1	[5] subclause 4.3.1				
Test CC C	Combination setting	$(N_{RB_{agg}})$	Highest NRB_a	agg	
as specifie	ed in Table 5.5A.3.	1-1 for the	NOTE 4		
CA Config	juration across bar	dwidth			
combinati	on sets supported	by the UE.			
Test SCS	as specified in Tab	le 5.3.5-1	Lowest		
-		-			
		=	est Parameter		
		nk Configura		Uplink Configuration	
Test ID	CC	PCC RB	SCC RB	CC	PCC RB
	Mod'n	allocation	allocation	Mod'n	allocation
1	CP-OFDM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1
	QPSK				
				nk are defined in Table 7.	
NOTE 2:				all be performed only with	
	ports connected a	nd 4Rx REFS	ENS requireme	ent (Table 7.3.2.5-2) is us	sed in the test
	requirements.				
NOTE 3:		30MHz test c	hannel bandwi	dth is tested with Low rar	ige test
	frequencies.				
NOTE 4:				n the CA Configuration wi	th the same
	N _{RB_agg} , only the c	ombination wi	th the highest I	NRB_PCC is tested.	

	Default Conditions							
Test Enviro	onment as specifie	ed in TS	Normal					
38.508-1 [5] subclause 4.1								
Test Frequ	encies as specifie	d in TS	NOTE 1					
38.508-1 [	5] subclause 4.3.1							
Test CC C	ombination setting	(N _{RB_agg} ) as	NOTE 1, NO	TE 3				
specified in	n Table 5.5A.2-1 fo	or the CA						
Configurat	ion across bandwi	dth						
combinatio	combination sets supported by the UE.							
Test SCS a	Test SCS as specified in Table 5.3.5-1			Lowest				
		Т	est Parameter	S				
	Downli	nk Configura	tion	Uplink Configuration				
Test ID	CC	PCC RB	SCC RB	CC	PCC RB			
	Mod'n	allocation	allocation	Mod'n	allocation			
1	CP-OFDM	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1			
	QPSK							
NOTE 1:	The specific config	guration of upl	ink and downlir	nk are defined in Table 7.	3A.1.4.1-3.			
				all be performed only with				
	ports connected a	nd 4Rx REFS	ENS requireme	ent (Table 7.3.2.5-2) is us	ed in the test			
	requirements.							
				n the CA Configuration wi	th the same			
	NRB_agg, only the c	ombination wi	th the highest I	NRB_PCC is tested.				

#### Table 7.5A.1.4.1-3: Test Configuration Table for intra-band non-conguous 2DL CA

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.5A.1.4.1-1, Table 7.5A.1.4.1-2 or Table 7.5A.1.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity NR, Connected without release on according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.5A.1.4.3.

#### 7.5A.1.4.2 Test Procedure

- 1. Intra-band contiguous CA test:
  - 1.1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
  - 1.2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.1.1. Message contents are defined in clause 7.5A.1.4.3.
  - 1.3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
  - 1.4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.5A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
  - 1.5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.5A.1.4.1-1. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
  - 1.6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-2 or 7.5A.1.5-2a as appropriate (Case 1). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control

window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.1.5-2 or Table 7.5A.1.5-2a for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
- Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 1.7. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-2 or 7.5A.1.5-2a as appropriate (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 1.8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 1.9. Repeat steps from 1.6 to 1.8, using an interfering signal above the wanted signal in Case 1 at step 1.7.
- 1.10. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-3 or 7.5A.1.5-3a as appropriate (Case 2). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.1.5-3 or Table 7.5A.1.5-3a for at least the duration of the Throughput measurement, where MU and Uplink power control window size are defined above.
- 1.11. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-3 or 7.5A.1.5-3a as appropriate (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 1.12. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 1.13. Repeat steps from 1.10 to 1.12, using an interfering signal above the wanted signal in Case 2 at step 1.11.
- 1.14. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.
- 2. Inter-band CA test:
  - 2.1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
  - 2.2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.1.1. Message contents are defined in clause 7.5A.1.4.3.
  - 2.3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
  - 2.4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.5A.1.4.1-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
  - 2.5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.5A.1.4.1-2. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
  - 2.6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-5 or 7.5A.1.5-8 as appropriate (Case 1). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.1.5-5 or Table 7.5A.1.5-8 for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
- Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 2.7. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-5 or 7.5A.1.5-8 as appropriate (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 2.8. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 2.9. Repeat steps from 2.6 to 2.8, using an interfering signal above the wanted signal in Case 1 at step 2.7.
- 2.10. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-6 or 7.5A.1.5-9 as appropriate (Case 2). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.1.5-6 or Table 7.5A.1.5-9 for at least the duration of the Throughput measurement, where MU and Uplink power control window size are defined above.
- 2.11. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-6 or 7.5A.1.5-9 as appropriate (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 2.12. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 2.13. Repeat steps from 2.10 to 2.12, using an interfering signal above the wanted signal in Case 2 at step 2.11.
- 2.14. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.
- 2.15. Repeat steps from 2.1 to 2.14 setting the original PCell as SCell and the original SCell as PCell in the corresponding CA configuration, except for operating bands without uplink band.
- 3. Intra-band non-contiguous CA test:
  - 3.1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
  - 3.2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.1.1. Message contents are defined in clause 7.5A.1.4.3.
  - 3.3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
  - 3.4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.5A.1.4.1-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
  - 3.5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.5A.1.4.1-3. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
  - 3.6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-11 or 7.5A.1.5-14 as appropriate (Case 1). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.1.5-11 or Table 7.5A.1.5-14 for at least the duration of the Throughput measurement, where:

- MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
- Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 3.7. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-11 or 7.5A.1.5-14 as appropriate (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 3.8. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 3.9. Repeat steps from 3.6 to 3.8, using an interfering signal above the wanted signal in Case 1 at step 3.7.
- 3.10. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-12 or 7.5A.1.5-15 as appropriate (Case 2). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.1.5-6 or Table 7.5A.1.5-9 for at least the duration of the Throughput measurement, where MU and Uplink power control window size are defined above.
- 3.11. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-12 or 7.5A.1.5-15 as appropriate (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 3.12. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 3.13. Repeat steps from 3.10 to 3.12, using an interfering signal above the wanted signal in Case 2 at step 3.11.
- 3.14. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### Table 7.5A.1.4.2-1: Void

7.5A.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

### 7.5A.1.5 Test Requirement

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.1.5-2, 7.5A.1.5-2a, 7.5A.1.5-3 and 7.5A.1.5-3a.

### Table 7.5A.1.5-1: ACS for intra-band contiguous 2DL CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

		CA Bandwidth Class		
Rx Parameter	Units	B C		
ACS	dB	26.0	33.0	

### Table 7.5A.1.5-1a: ACS for intra-band contiguous CA with F_{DL_low} < 2700 MHz and F_{UL_low} < 2700 MHz

		CA Bandwidth Class			
Rx Parameter	Units	В	С		
ACS	dB	20.0	17.0		

## Table 7.5A.1.5-2: Test parameters for intra-band contiguous 2DL CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 1

Rx Parameter	Units	CA Ban	dwidth Class
		В	С
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB	REFSENS + 14 dB
PInterferer	dBm	Aggregated power + 24.5 dB	Aggregated power + 31.5 dB
BWInterferer	MHz	20	BWchannel CA
FInterferer (offset)	MHz	10 + F _{offset}	BW _{channel} CA
		/	/
		-10 -F _{offset}	-BW _{channel} CA
NOTE 1: The transmitter shall b 7.3.2.3-3 with P _{CMAX_L} ,			n UL configuration specified in Table
NOTE 2: The absolute value of	the interfe	rer offset F _{interferer} (offset) shall be f	urther adjusted to
$   F_{\text{interferer}}   / SCS   + 0.5$	^{MH}	z with SCS the sub-carrier spacing	g of the wanted signal in MHz. The
interferer is an NR sig	nal with an	SCS equal to that of the wanted s	signal.
		C specified in Annexes A.3.2.2 an	
OCNG Pattern OP.1 F	DD/TDD fo	or the DL-signal as described in A	nnex A.5.1.1/A.5.2.1.

### Table 7.5A.1.5-2a: Test parameters for intra-band contiguous CA with $F_{DL_low}{<}2700$ MHz and $F_{UL_low}{<}2700$ MHz, case 1

	Rx Parameter	Units	CA Ban	dwidth Class			
			В	С			
Pw	in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB	REFSENS + 14 dB			
	PInterferer	dBm	Aggregated power + 18.5 dB	Aggregated power + 15.5 dB			
BWInterferer		MHz	5	5			
	FInterferer (offset)	MHz	2.5 + F _{offset}	2.5 + F _{offset}			
			/	/			
			-2.5 - F _{offset}	-2.5 - F _{offset}			
NOTE 1:	The transmitter shall be set to 4 d	B below P _{CMAX_L,f,c} at	the minimum UL configur	ation specified in Table			
	7.3.2-3 with PCMAX_L,f,c defined in c	lause 6.2.4.					
NOTE 2:	The absolute value of the interfere	er offset Finterferer (offse	et) shall be further adjuste	ed to			
	$\left( \left  F_{\text{interferer}} \right  / SCS \right  + 0.5 \right) SCS \text{ MHz}$	with SCS the sub-ca	rrier spacing of the wante	d signal in MHz. The			
	$\left(\left F_{\text{interferer}}\right  / SCS\right  + 0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.						
NOTE 3:	The interferer consists of the RMC Pattern OP.1 FDD/TDD for the DI						

## Table 7.5A.1.5-3: Test parameters for intra-band contiguous 2DL CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 2

Rx Parameter	Units	CA Bandy	width Class
		В	С

Pw in Transmission Bandwidth Configuration, per CC	dBm	-49.5 + 10log(N _{RB,c} /N _{RB_agg} )	-56.5			
PInterferer	dBm	-25	-25			
BWInterferer	MHz	20	BW _{channel} CA			
FInterferer (offset)	MHz	10 + F _{offset}	BW _{channel} CA			
		/	/			
		-10 -F _{offset}	-BW _{channel} CA			
NOTE 1: The transmitter shall be	e set to 24 dE	B below P _{CMAX_L,f,c} at the minimum U	configuration specified in Table			
7.3.2.3-3 with PCMAX_L,f	c defined in c	lause 6.2.4.3.				
NOTE 2: The absolute value of t	he interferer	offset F _{interferer} (offset) shall be furthe	r adjusted to			
$\left( \left  F_{\text{interferer}} \right  / SCS \right] + 0.5$	) <i>SCS</i> MHz w	ith SCS the sub-carrier spacing of th	ne wanted signal in MHz. The			
interferer is an NR sign	$\left(\left F_{\text{interferer}}\right /SCS +0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.					
NOTE 3: The interferer consists	of the RMC s	pecified in Annexes A.3.2.2 and A.3	3.3.2 with one sided dynamic OCNG			
Pattern OP.1 FDD/TDI	) for the DL-s	ignal as described in Annex A.5.1.1	/A.5.2.1.			

## Table 7.5A.1.5-3a: Test parameters for intra-band contiguous CA with $F_{DL_low}\!<\!\!2700$ MHz and $F_{UL_low}\!<\!\!2700$ MHz, case 2

	Rx Parameter		CA Bandw	idth Class	
			В	С	
Pw in Transmission Bandwidth Configuration, per CC		dBm	-43.5+ 10log(N _{RB,c} /N _{RB_agg} )	-40.5+ 10log(N _{RB,c} /N _{RB_agg} )	
	PInterferer	dBm	-25	-25	
	BWInterferer	MHz	5	5	
	FInterferer (Offset)	MHz	2.5+ Foffset	2.5+ F _{offset}	
			/	/	
			-2.5- F _{offset}	-2.5- F _{offset}	
NOTE 1:	The transmitter shall be set	to 24 dB below P	CMAX_L,f,c at the minimum UL configu	uration specified in Table 7.3.2-	
	3 with PCMAX_L,f,c defined in a	clause 6.2.4.			
NOTE 2:	The absolute value of the ir	terferer offset Fint	erferer (offset) shall be further adjuste	ed to	
	$\left( \left  F_{\text{interferer}} \right  / SCS \right  + 0.5 \right) SCS$	$_{S}$ MHz with SCS t	he sub-carrier spacing of the wante	ed signal in MHz. The interferer	
	is an NR signal with an SCS	S equal to that of t	the wanted signal.		
			in Annexes A.3.2.2 and A.3.3.2 with	n one sided dynamic OCNG	
			described in Annex A.5.1.1/A.5.2.1		

For NR SCC of inter-band CA with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in [Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1)] with parameters specified in Tables 7.5A.1.5-5 and 7.5A.1.5-6.

Table 7.5A.1.5-4: ACS for NR band with  $F_{DL_{high}}$  < 2700 MHz and  $F_{UL_{high}}$  < 2700 MHz

RX parameter	Units	Channel bandwidth					
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	
ACS	dB	33	33	30	27	26	
RX parameter	Units	Channel bandwidth					
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	
ACS	dB	25.5	24	23	22.5	21	
RX parameter	Units	Channel bandwidth					
		90 MHz	100 MHz				
ACS	dB	20.5	20				

RX parameter	Units	Channel bandwidth					
•		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	
Pw in Transmission Bandwidth Configuration, per CC	dBm			EFSENS + 14 c			
Pinterferer	dBm	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 42.5 dB	REFSENS for SCC + 39.5 dB	REFSENS for SCC + 38.5 dB	
BWinterferer	MHz	5	5	5	5	5	
Finterferer (offset from SCC)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15	
RX parameter	Units			hannel bandwic			
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	
Pw in Transmission Bandwidth Configuration, per CC	dBm		ĸ	REFSENS + 14 d	в		
Pinterferer	dBm	REFSENS for SCC + 38 dB	REFSENS for SCC + 36.5 dB	REFSENS for SCC + 35.5 dB	REFSENS for SCC + 35 dB	REFSENS for SCC + 33.5 dB	
BWinterferer	MHz	5	5	5	5	5	
F _{interferer} (offset from SCC)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5	
RX parameter	Units	Channel bandwidth					
		90 MHz 100 MHz					
Pw in Transmission Bandwidth Configuration, per CC	dBm		S + 14 dB				
Pinterferer	dBm	REFSENS for SCC + 33 dB	REFSENS for SCC + 32.5 dB				
BWinterferer	MHz	5	5				
F _{interferer} (offset from SCC)	MHz	47.5 / -47.5	52.5 / -52.5				
NOTE 2: The ab $\left( \int  F_{inter} \right)$ The initial NOTE 3: The initial sided of	7.3.2.3-3 wi psolute valu $_{\text{ferer}}   / SCS ]$ terferer is a terferer con	all be set to 4dB th $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5)SCS MHz n NR signal with sists of the NR ir	below P _{CMAX_L,f,} ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to nterferer RMC sp	2.4. offset) shall be f b-carrier spacing that of the wan becified in Annex	urther adjusted to g of the wanted si	ignal in MHz. .3.3.2 with on	

# Table 7.5A.1.5-5: Test parameters for NR inter-band CA with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz, case 1

RX parameter	Units							
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz		
Pw in Transmission Bandwidth Configuration, per CC	dBm	-56.5	-56.5	-53.5	-50.5	-49.5		
Pinterferer	dBm			-25		•		
BWinterferer	MHz	5	5	5	5	5		
F _{interferer} (offset from SCC)	MHz	5 /	7.5 /	10 /	12.5 /	15 /		
		-5	-7.5	-10	-12.5	-15		
RX parameter	Units	00 MIL		hannel bandwid				
Pw in	dBm	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Transmission Bandwidth Configuration, per CC	abm	-49	-47	-46.5	-46	-44.5		
Pinterferer	dBm		-25					
BWinterferer	MHz	5	5	5	5	5		
F _{interferer} (offset from SCC)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5		
RX parameter	Units	Channel bandwidth						
in parameter	•	90 MHz	100 MHz					
Pw in Transmission Bandwidth Configuration, per CC	dBm	-44	-43.5					
Pinterferer	dBm	-2	25					
BWinterferer	MHz	5	5					
F _{interferer} (offset from SCC)	MHz	47.5 / -47.5	52.5 / -52.5					
NOTE 2: The at $\left( \begin{bmatrix}   F_{inter} \\ The in \end{bmatrix} \right)$ NOTE 3: The in	7.3.2.3-3 wi psolute valu $_{ferer}   / SCS ]$ terferer is a terferer const	all be set to 24 c th $P_{CMAX_L,f,c}$ defi e of the interfere +0.5) $SCS$ MHz n NR signal with sists of the RMC	B below P _{CMAX} ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to specified in Anr	2.4. offset) shall be f b-carrier spacing that of the wan nexes A.3.2.2 an	further adjusted to g of the wanted s ted signal.	o signal in MHz. ne sided		

### Table 7.5A.1.5-6: Test parameters for NR inter-band CA with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz, case 2

For NR SCC of inter-band CA with  $F_{DL_{low}} \ge 3300$  MHz and  $F_{UL_{low}} \ge 3300$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in [Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1)] with parameters specified in Tables 7.5A.1.5-8 and 7.5A.1.5-9.

Table 7.5A.1.5-7: ACS for NR bands with  $F_{DL_low} \ge 3300 \text{ MHz}$  and  $F_{UL_low} \ge 3300 \text{ MHz}$ 

RX parameter	Units	Channel bandwidth					
		10 MHz 15 MHz 20 MHz 40 MHz 50 MH					
ACS	dB	33	33	33	33	33	
RX parameter	Units	Channel bandwidth					
		60 MHz	80 MHz	90 MHz	100 MHz		
ACS	dB	33	33	33	33		

RX parameter	Units	Channel bandwidth							
-		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz			
Pw in Transmission Bandwidth Configuration, per CC	dBm		R	EFSENS + 14 d	В				
Pinterferer	dBm		REFSENS for SCC + 45.5 dB						
BWinterferer	MHz	10	15	20	40	50			
F _{interferer} (offset from SCC)	MHz	10 / -10	15 / -15	20 / -20	40 / -40	50 / -50			
RX parameter	Units	Channel bandwidth							
IX parameter	Onits	60 MHz	80 MHz	90 MHz	100 MHz				
Pw in Transmission Bandwidth Configuration, per CC	dBm		REFSEN	S + 14 dB					
Pinterferer	dBm	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB				
BWinterferer	MHz	60	80	90	100				
Finterferer (offset from SCC)	MHz	60 / -60	80 / -80	90 / -90	100 / -100				
NOTE 2: The ab $\left( \begin{bmatrix} F_{interf} \end{bmatrix} \right)$ The int NOTE 3: The int	7.3.2.3-3 wi solute value  SCS - terferer is an terferer const	th $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5)SCS MHz n NR signal with sists of the RMC	below P _{CMAX_L,f,} ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to specified in Ann D/TDD for the DL	2.4. offset) shall be fu b-carrier spacing that of the want texes A.3.2.2 and	urther adjusted to of the wanted s red signal. d A.3.3.2 with on	o ignal in MHz. ie sided			

# Table 7.5A.1.5-8: Test parameters for NR inter-band CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 1

RX parameter	Units		CI	nannel bandwid	lth	
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Pw in	dBm					
Transmission						
Bandwidth				-56.5		
Configuration,						
per CC						
Pinterferer	dBm			-25		
BWinterferer	MHz	10	15	20	40	50
Finterferer (offset	MHz	10	15	20	40	50
from SCC)		/	/	/	/	/
		-10	-15	-20	-40	-50
RX parameter	Units		lth			
		60 MHz	80 MHz	90 MHz	100 MHz	
Pw in	dBm					
Transmission						
Bandwidth			-56	6.5		
Configuration,						
per CC						
Pinterferer	dBm	-25	-25	-25	-25	
BWinterferer	MHz	60	80	90	100	
Finterferer (offset	MHz	60	80	90	100	
from SCC)		/	/	/	/	
		-60	-80	-90	-100	
NOTE 1: The tra					ım UL configurati	on specified in
			ned in clause 6.2			
NOTE 2: The at	solute valu	e of the interfere	r offset Finterferer (	offset) shall be f	urther adjusted to	)
$ F_{\text{inter}} $	$_{\rm ferer}   / SCS  $	+0.5)SCS MHz	with SCS the su	b-carrier spacing	g of the wanted s	ignal in MHz.
The in	erferer is an	NR signal with	an SCS equal to	that of the wan	ted signal.	
					d A.3.3.2 with on	e sided
					ibed in Annex A.	

### Table 7.5A.1.5-9: Test parameters for NR inter-band CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 2

For NR SCC of intra-band non-contiguous CA with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 with parameters specified in Tables 7.5A.1.5-11 and 7.5A.1.5-12.

Table 7.5A.1.5-10: ACS for NR band with $F_{DL_{high}}$ < 2700 MHz and $F_{UL_{high}}$ < 2700 MHz
---------------------------------------------------------------------------------------------------

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
ACS	dB	33	33	30	27	26
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
ACS	dB	25.5	24	23	22.5	21
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
ACS	dB	20.5	20			

Table 7.5A.1.5-11: Test parameters for NR intra-band non-contiguous CA with F _{DL_high} < 2700 MHz and
F _{UL_high} < 2700 MHz, case 1

RX parameter	Units	Channel bandwidth					
•		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	
Pw in Transmission Bandwidth Configuration, per CC	dBm		R	EFSENS + 14 c	B		
Pinterferer	dBm	REFSENS	REFSENS	REFSENS	REFSENS	REFSENS	
		for SCC +	for SCC +	for SCC +	for SCC +	for SCC +	
		45.5 dB	45.5 dB	42.5 dB	39.5 dB	38.5 dB	
BWinterferer	MHz	5	5	5	5	5	
Finterferer (offset	MHz	5	7.5	10	12.5	15	
from SCC)		/	/	/	/	/	
		-5	-7.5	-10	-12.5	-15	
RX parameter	Units		C	hannel bandwic	lth		
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	
Pw in	dBm		R	EFSENS + 14 d	B		
Transmission Bandwidth Configuration, per CC							
Pinterferer	dBm	REFSENS	REFSENS	REFSENS	REFSENS	REFSENS	
		for SCC + 38	for SCC +	for SCC +	for SCC + 35	for SCC +	
		dB	36.5 dB	35.5 dB	dB	33.5 dB	
BWinterferer	MHz	5	5	5	5	5	
Finterferer (offset	MHz	17.5	22.5	27.5	32.5	42.5	
from SCC)		/	/	/	/	/	
		-17.5	-22.5	-27.5	-32.5	-42.5	
RX parameter	Units		C	hannel bandwic	lth		
		90 MHz	100 MHz				
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSEN	S + 14 dB				
Pinterferer	dBm	REFSENS	REFSENS				
interiorer	-	for SCC + 33	for SCC +				
		dB	32.5 dB				
BWinterferer	MHz	5	5				
Finterferer (offset	MHz	47.5	52.5				
from SCC)		/	/				
,		-47.5	-52.5				
NOTE 2: The at $\int  F_{inter} $	7.3.2.3-3 w bsolute value $r_{ferer}   SCS  $ terferer is a	ith $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5) <i>SCS</i> MHz n NR signal with	ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to	2.4. offset) shall be f b-carrier spacing o that of the wan	urther adjusted to g of the wanted s ted signal.	o ignal in MHz.	
sided					es A.3.2.2 and A described in Anr		

RX parameter	Units	Channel bandwidth						
	•	5 MHz 10 MHz 15 MHz 20 MHz 25 MHz						
Pw in Transmission Bandwidth Configuration, per CC	dBm	-56.5	-56.5	-53.5	-50.5	-49.5		
Pinterferer	dBm		•	-25		•		
BWinterferer	MHz	5	5	5	5	5		
F _{interferer} (offset from SCC)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15		
RX parameter	Units	-		hannel bandwid				
•		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Pw in Transmission Bandwidth Configuration, per CC	dBm	-49	-47	-46.5	-46	-44.5		
Pinterferer	dBm			-25				
BWinterferer	MHz	5	5	5	5	5		
F _{interferer} (offset from SCC)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5		
RX parameter	Units	11.0		hannel bandwig		12.0		
	••••••	90 MHz	100 MHz					
Pw in Transmission Bandwidth Configuration, per CC	dBm	-44	-43.5					
Pinterferer	dBm	-2	25					
BWinterferer	MHz	5	5					
F _{interferer} (offset from SCC)	MHz	47.5 / -47.5	52.5 / -52.5					
NOTE 2: The at $ ( \begin{bmatrix} F_{\text{inter}} \\ F_{\text{inter}} \end{bmatrix} ) $ The in NOTE 3: The in	7.3.2.3-3 with the solute value $ SCS $ the solute value $ SCS $ the solution of the solution	all be set to 24 c th $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5)SCS MHz n NR signal with sists of the RMC	B below P _{CMAX} ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to specified in Anr	2.4. offset) shall be f b-carrier spacing that of the wan nexes A.3.2.2 an	urther adjusted t g of the wanted s ted signal.	o ignal in MHz. ne sided		

### Table 7.5A.1.5-12: Test parameters for NR intra-band non-contiguous CA with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz, case 2

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For NR SCC of intra-band non-contiguous CA with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 with parameters specified in Tables 7.5A.1.5-14 and 7.5A.1.5-15.

### Table 7.5A.1.5-13: ACS for NR bands with $F_{DL_low} \ge 3300 \text{ MHz}$ and $F_{UL_low} \ge 3300 \text{ MHz}$

RX parameter	Units	Channel bandwidth					
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz	
ACS	dB	33	33	33	33	33	
RX parameter	Units	Channel bandwidth					
		60 MHz	80 MHz	90 MHz	100 MHz		
ACS	dB	33	33	33	33		

Table 7.5A.1.5-14: Test parameters for NR intra-band non-contiguous CA with F _{DL_low} ≥ 3300 MHz and
F _{UL_low} ≥ 3300 MHz, case 1

dBm dBm MHz MHz Units	10 MHz 10 10 / -10		<b>20 MHz</b> EFSENS + 14 d ENS for SCC + 4 20 20		50 MHz	
dBm MHz MHz Units	10 /	REFSI 15 15 /	ENS for SCC + 4	5.5 dB 40		
MHz MHz Units	10 /	15 15 /	20	40		
MHz Units	10 /	15 /	-	-		
Units	/	/	20	40	= 0	
	-10	-15	/	/	50 /	
			-20 hannel bandwid	-40	-50	
	60 MHz	80 MHz	90 MHz	100 MHz		
	REFSENS + 14 dB					
dBm	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB		
MHz	60	80	90	100		
MHz	60 / -60	80 / -80	90 / -90	100 / -100		
3.2.3-3 with a solute value $r_{er}   / SCS  $ -	th $P_{CMAX_L,f,c}$ define e of the interfere + 0.5) <i>SCS</i> MHz n NR signal with sists of the RMC	ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to specified in Ann	2.4. offset) shall be fu b-carrier spacing that of the want nexes A.3.2.2 and	urther adjusted to g of the wanted si ted signal. d A.3.3.2 with on	o ignal in MHz. e sided	
er er	MHz MHz 3.2.3-3 wir blute value  / SCS ]- ferer is an ferer cons	dBm REFSENS for SCC + 45.5 dB MHz 60 MHz 60 MHz 60 / -60 smitter shall be set to 4dB 3.2.3-3 with P _{CMAX_L,f,c} defi blue value of the interfere  /SCS  + 0.5)SCS MHz ferer is an NR signal with ferer consists of the RMC	dBmREFSENS for SCC + 45.5 dBREFSENS for SCC + for SCC + 45.5 dBMHz6080MHz6080MHz6080// -60-80smitter shall be set to 4dB below PCMAX_L,f, a.2.3-3 with PCMAX_L,f,c defined in clause 6.22.3-3 with PCMAX_L,f,c defined in clause 6.2B.2.3-3 with PCMAX_L,f,c defined in clause 6.2-80B.2.3-3 with PCMAX_L,f,c defined in clause 6.2-80B.3.3 with PCMAX_L,f,c defined in clause 6.2-80B.3.4 with PCMAX_L,f,c defined in clause 6.2-80B.3.5 With PCMAX_L,f,c defined in clause 6.2-80B.3.6 With PCMAX_L,f,c defined in clause 6.2-80<	REFSENS + 14 dBdBmREFSENS for SCC + 45.5 dBREFSENS for SCC + for SCC + for SCC + for SCC + 45.5 dBMHz608090MHz608090MHz608090MHz608090MHz608090Smitter shall be set to 4dB below $P_{CMAX_L,f,c}$ at the minimum $B.2.3$ -3 with $P_{CMAX_L,f,c}$ defined in clause 6.2.4. olute value of the interferer offset Finterferer (offset) shall be find $ /SCS  + 0.5)SCS$ MHz with SCS the sub-carrier spacing ferer is an NR signal with an SCS equal to that of the want ferer consists of the RMC specified in Annexes A.3.2.2 and	REFSENS + 14 dB           dBm         REFSENS for SCC + 45.5 dB         REFSENS for SCC + 45.5 dB         REFSENS for SCC + 45.5 dB         REFSENS for SCC + 45.5 dB           MHz         60         80         90         100           mitter shall be set to 4dB below PCMAX_Lift         the minimum UL configuration	

Table 7.5A.1.5-15: Test parameters for NR intra-band non-contiguous CA with F _{DL_low} ≥ 3300 MHz and
F _{UL_low} ≥ 3300 MHz, case 2

RX parameter	Units		CI	nannel bandwic	dth	
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Pw in	dBm					
Transmission						
Bandwidth				-56.5		
Configuration,						
per CC						
Pinterferer	dBm			-25		
BWinterferer	MHz	10	15	20	40	50
Finterferer (offset	MHz	10	15	20	40	50
from SCC)		/	/	/	/	/
		-10	-15	-20	-40	-50
RX parameter	Units		-	nannel bandwic		
		60 MHz	80 MHz	90 MHz	100 MHz	
Pw in	dBm					
Transmission						
Bandwidth			-56	6.5		
Configuration,						
per CC			1		1	
Pinterferer	dBm	-25	-25	-25	-25	
BWinterferer	MHz	60	80	90	100	
Finterferer (offset	MHz	60	80	90	100	
from SCC)		/	/	/	/	
		-60	-80	-90	-100	
					um UL configurati	on specified in
Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.						
NOTE 2: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to						
$\left(\left F_{\text{interferer}}\right  / SCS \right  + 0.5 SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.						
The interferer is an NR signal with an SCS equal to that of the wanted signal.						
					d A.3.3.2 with on	
dynam	ic OCNG P	attern OP.1 FDE	D/TDD for the DL	-signal as descr	ibed in Annex A.5	5.1.1/A.5.2.1.

### 7.5A.2 Adjacent channel selectivity for 3DL CA

### 7.5A.2.1 Test Purpose

Adjacent channel selectivity for 3DL CA verifies the receiver's ability to receive a wanted 3DL carrier aggregated at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel.

### 7.5A.2.2 Test Applicability

This test case applies to all types of NR UE release 15 and forward that support 3DL CA.

### 7.5A.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.5A.0.

7.5A.2.4	Test Description
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7.5A.2.4.1 Initial Conditions

Same as in clause 7.5A.1.4.1 with following exceptions:

- Instead of Table 7.5A.1.4.1-1  $\rightarrow$  use Table 7.5A.2.4.1-1.
- Instead of Table 7.5A.1.4.1-2→ use Table 7.5A.2.4.1-1.
- Instead of Table 7.5A.1.4.1-3→ use Table 7.5A.2.4.1-1.

Default Conditions						
Test Environment as specified in TS Normal						
	3-1 [5] sub					
Test F	requencies	s as specified in TS			ange for PCC and SCC	Cs
38.508	3-1 [5] sub	clause 4.3.1		A: NOTE 1, NO		
					iguous : NOTE 1, NOT	
					contiguous : NOTE 1 v	
					d in table 7.3A.2.4.1-1(	
		ation setting (N _{RB_agg} )			est N _{RB_agg} , Highest N _{RE}	3_agg
		ables 5.5A.1-1,	Inter-band: Hi			
		es in clauses 5.5A.3.x			iguous : Highest N _{RB_ag}	
		guration across		ntra-band non-	contiguous : Highest N	RB_agg
		ination sets	NOTE 6			
	rted by the					
Test S	SCS as spe	cified in Table 5.3.5-	Lowest for PC	CC and SCCs		
Netwo	ork signallir	ng value	NS_01			
		-		by Table 7.3.2	.3-4 for the band with a	ctive uplink carrier
				arameters		
		Downlink Con			Uplink Co	nfiguration
Tes	CC	PCC RB allocation	SCC ₁ RB	SCC ₂ RB	CC	PCC RB allocation
t ID	Mod'n		allocation	allocation	Mod'n	
					n (Intra-band contigue	
1	CP-	NOTE 1	NOT	ΓE 1	DFT-s-OFDM	NOTE 1
	OFDM				QPSK	
	QPSK					
					onfiguration (Inter-ba	
1	CP-	NOTE 1	NOT	IE 1	DFT-s-OFDM	NOTE 1
	OFDM				QPSK	
	QPSK	Settings for a CA_nXC				(A Configurations
U	elault Test		itra-band cont			A Configurations
1	CP-	NOTE 1	NO		DFT-s-OFDM	NOTE 1
•	OFDM	NOTET	NO		QPSK	NOTET
	QPSK				GION	
		Default Test	Settings for a	$C\Delta nX(2\Delta) - n'$	YA Configuration	1
			a-band non-co			
1	CP-	NOTE 1	NOT		DFT-s-OFDM	NOTE 1
-	OFDM			-	QPSK	
	QPSK					
NOTE		pecific configuration of	uplink and dow	nlink are define	ed in Table 7.3A.2.4.1-	1. Only test points
	verifyi	ng non-exceptional RE	FSENS require	ments are use	d for ACS.	<b>7</b> 1
NOTE 2: CA Configuration Test CC Combination test settings are checked separately for each CA						
Configuration.						
NOTE 3: Inter-band: X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n3A-						
	n8A, X=1, Y=3, Z=8; Intra-band contiguous + Inter-band: X,Y correspond to the different bands in					
	the CA Configuration, e.g. for CA_1C-3A, X=1,Y=3; Intra-band non-contiguous + Inter-band: X and					
Y correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n1A-n8A, X=1, Y =8						
NOTE 4: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected						
and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.						
NOTE 5: For NR band n28, 30MHz test channel bandwidth is tested with Low range test frequencies.						
NOTE	NOTE 6: If the UE supports multiple CC Combinations in the CA Configuration with the same $N_{RB_{agg}}$ , only the					
	combination with the highest NRB_PCC is tested.					

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.5A.2.4.1-1.

- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.5A.2.4.3.

### Table 7.5A.2.4.1-2: Void

#### Table 7.5A.2.4.1-3: Void

#### 7.5A.2.4.2 Test Procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.1.1. Message contents are defined in clause 7.5A.2.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.5A.2.4.1-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.5A.2.4.1-1 on PCC. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level according to Table 7.5A.2.4.2-1 as appropriate (Case 1). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.2.4.2-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 7. Set the Interferer signal level to the value as defined in Table 7.5A.2.4.2-1 as appropriate (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 8. Measure the average throughput for the carrier(s) indicated in Table 7.5A.2.4.2-1 for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal in Case 1 at step 7.
- 10. Set the Downlink signal level according to Table 7.5A.2.4.2-1 as appropriate (Case 2). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.2.4.2-1 for at least the duration of the Throughput measurement, where MU and Uplink power control window size are defined above.
- 11. Set the Interferer signal level to the value as defined in 7.5A.2.4.2-1 as appropriate (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 12. Measure the average throughput for the carrier(s) indicated in Table 7.5A.2.4.2-1 for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 13. Repeat steps from 10 to 12, using an interfering signal above the wanted signal in Case 2 at step 11.
- 14. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

Intra-band contiguous         16         PCC, SCC1, SCC2         7.5A.2.5-14           Inter-band         11         7.5A.2.5-34         7.5A.2.5-34           Inter-band         21         7.5A.2.5-5         7.5A.2.5-5           31         SCC1, SCC2         7.5A.2.5-7         7.5A.2.5-7           Intra-band contiguous +         31         SCC1, SCC2         7.5A.2.5-8	CA configuration	CA configuration ID in REFSENS	Throughput measured on	Table with test parameters to select				
Inter-band         11         7.5A.2.5-2 ⁴ 1         7.5A.2.5-4         7.5A.2.5-4           2 ¹ 7.5A.2.5-5         7.5A.2.5-6           3 ¹ SCC1, SCC2         7.5A.2.5-7           1ntra-band contiguous +         7.5A.2.5-8         7.5A.2.5-9           Intra-band contiguous +         12         SCC2         7.5A.2.5-4           11 ² SCC2         7.5A.2.5-6         7.5A.2.5-6           12 ² SCC2         7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7         7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-9         7.5A.2.5-1 ⁵ 7.5A.2.5-7         7.5A.2.5-1 ⁵ 2 ² SCC1, SCC2         7.5A.2.5-2 ⁵ 7.5A.2.5-3 ⁵ 1ntra-band non-contiguous + Inter-band         1 ³ 7.5A.2.5-3         7.5A.2.5-6           2 ² SCC1, SCC2         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-7         7.5A.2.5-6         7.5A.2.5-6           2 ³ 7.5A.2.5-6         7.5A.2.5-6         7.5A.2.5-7           7.5A.2.5-6         SCC1, SCC2         7.5A.2.5-7         7.5A.2.5-8           2 ³ 7.5A.2.5-6         7.5A.2.5-6         7.5A.2.5-	Intra-band contiguous							
Inter-band         11         7.5A 2.5-3 ⁴ 21         7.5A 2.5-4         7.5A 2.5-5           31         SCC1, SCC2         7.5A 2.5-6           7.5A 2.5-7         7.5A 2.5-7           7.5A 2.5-8         7.5A 2.5-7           Intra-band contiguous +         7.5A 2.5-7           Inter-band         12         SCC2           7.5A 2.5-7         7.5A 2.5-7           7.5A 2.5-8         7.5A 2.5-6           7.5A 2.5-7         7.5A 2.5-7           7.5A 2.5-6         7.5A 2.5-7           7.5A 2.5-7         7.5A 2.5-7           7.5A 2.5-1         7.5A 2.5-16           7.5A 2.5-10         7.5A 2.5-7           7.5A 2.5-10         7.5A 2.5-18           7.5A 2.5-10         7.5A	inita bana contiguous		1 00, 0001, 0002					
Inter-band         11         7.5A.2.5-4           21         7.5A.2.5-5         7.5A.2.5-6           31         SCC1, SCC2         7.5A.2.5-6           7.5A.2.5-9         7.5A.2.5-8         7.5A.2.5-9           Intra-band contiguous + Inter-band         12         SCC2         7.5A.2.5-9           112         SCC2         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-7         7.5A.2.5-6         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-9         7.5A.2.5-1a ⁶ 7.5A.2.5-1a ⁵ 7.5A.2.5-3a ⁵ 7.5A.2.5-3a ⁵ 7.5A.2.5-3a ⁵ 7.5A.2.5-3a ⁵ 7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-7         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-8         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-9         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-7         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-8         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-8 <td></td> <td></td> <td></td> <td></td>								
21         7.5A.2.5-5           31         SCC1, SCC2         7.5A.2.5-7           1ntra-band contiguous + Inter-band         7.5A.2.5-8         7.5A.2.5-8           12         SCC2         7.5A.2.5-4           7.5A.2.5-4         7.5A.2.5-5         7.5A.2.5-6           7.5A.2.5-5         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-9         7.5A.2.5-18         7.5A.2.5-28           7.5A.2.5-13         7.5A.2.5-26         7.5A.2.5-26           7.5A.2.5-26         7.5A.2.5-26         7.5A.2.5-36           7.5A.2.5-3         7.5A.2.5-6         7.5A.2.5-6           SCC1, SCC2         7.5A.2.5-6         7.5A.2.5-6           7.5A.2.5-6         SCC2         7.5A.2.5-6           7.5A.2.5-7         7.5A.2.5-6         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-8         7.5A.2.5-8           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-7           7.5A.2.5-1         7.5A.2.5-7         7.5A.2.5-8           7.5A.2.5-1         SCC1, SCC2         7.5A.2.5-8	Inter-band	1 ¹						
31         SCC1, SCC2         7.5A.2.5-6 7.5A.2.5-7 7.5A.2.5-8 7.5A.2.5-9           Intra-band contiguous + Inter-band         12         SCC2         7.5A.2.5-4 7.5A.2.5-6 7.5A.2.5-6 7.5A.2.5-7 7.5A.2.5-8 7.5A.2.5-1a ⁶ 12         SCC2         7.5A.2.5-1 7.5A.2.5-1a ⁶ 7.5A.2.5-1a ⁶ 22         SCC1, SCC2         7.5A.2.5-3a ⁵ 1ntra-band non- contiguous + Inter-band         1 ³ 7.5A.2.5-3a ⁵ 1ntra-band non- contiguous + Inter-band         1 ³ 7.5A.2.5-3a ⁵ 22         SCC1, SCC2         7.5A.2.5-3a ⁵ 7.5A.2.5-3a ⁵ 7.5A.2.5-3a ⁵ 7.5A.2.5-3a ⁵ 7.5A.2.5-4 7.5A.2.5-4           23         7.5A.2.5-4 7.5A.2.5-6 7.5A.2.5-7 7.5A.2.5-8           23         7.5A.2.5-6 7.5A.2.5-7 7.5A.2.5-8 8.75A.2.5-9           23         7.5A.2.5-6 7.5A.2.5-7 7.5A.2.5-8 7.5A.2.5-9           23         7.5A.2.5-6 7.5A.2.5-7 7.5A.2.5-8 7.5A.2.5-9           24         SCC1, SCC2         7.5A.2.5-7 7.5A.2.5-8 7.5A.2.5-9           NOTE 1:         CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA- nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1           NOTE 3:         CA configuration ID as defined in "Default Test Settings for a CA_nXC/2A)-nYA Configuration (Intra- band non-contiguous + Inter-band)" i								
31         SCC1, SCC2         7,5A,2,5-7           Intra-band contiguous + inter-band         7,5A,2,5-8         7,5A,2,5-4           112         SCC2         7,5A,2,5-5           7,5A,2,5-7         7,5A,2,5-6           7,5A,2,5-7         7,5A,2,5-7           7,5A,2,5-7         7,5A,2,5-7           7,5A,2,5-8         7,5A,2,5-7           7,5A,2,5-8         7,5A,2,5-7           7,5A,2,5-16         7,5A,2,5-16           7,5A,2,5-13         7,5A,2,5-26           7,5A,2,5-24         7,5A,2,5-26           7,5A,2,5-24         7,5A,2,5-26           7,5A,2,5-36         7,5A,2,5-26           7,5A,2,5-26         7,5A,2,5-26           7,5A,2,5-36         7,5A,2,5-26           7,5A,2,5-36         7,5A,2,5-6           7,5A,2,5-6         7,5A,2,5-6           7,5A,2,5-7         7,5A,2,5-7           7,5A,2,5-8         7,5A,2,5-7           7,5A,2,5-9         7,5A,2,5-6           SCC1, SCC2         7,5A,2,5-7           7,5A,2,5-9         7,5A,2,5-7           7,5A,2,5-9         7,5A,2,5-7           7,5A,2,5-9         7,5A,2,5-8           SCC1, SCC2         7,5A,2,5-7           7,5A,2,5-9         7,5A,2,5-7			0001 0000					
3'         7,5A,2,5-8           Intra-band contiguous + Inter-band         7,5A,2,5-4           12'         SCC2           7,5A,2,5-5           7,5A,2,5-6           7,5A,2,5-7           7,5A,2,5-8           7,5A,2,5-7           7,5A,2,5-8           7,5A,2,5-15           7,5A,2,5-16           7,5A,2,5-15           7,5A,2,5-15           7,5A,2,5-15           7,5A,2,5-16           7,5A,2,5-25           7,5A,2,5-245           7,5A,2,5-245           7,5A,2,5-25           7,5A,2,5-36           7,5A,2,5-36           7,5A,2,5-36           7,5A,2,5-36           7,5A,2,5-36           7,5A,2,5-37           7,5A,2,5-38           7,5A,2,5-4           7,5A,2,5-4           7,5A,2,5-5           SCC1, SCC2           7,5A,2,5-6           7,5A,2,5-7           7,5A,2,5-8           7,5A,2,5-8           7,5A,2,5-9           2'3           2'3           7,5A,2,5-9           SCC1, SCC2           7,5A,2,5-9           SC1, SCC2           7,5A,		01	SCC1, SCC2					
Intra-band contiguous + Inter-band         12         SCC2         7.5A.2.5-4 7.5A.2.5-7 7.5A.2.5-7           12         SCC2         7.5A.2.5-6 7.5A.2.5-7         7.5A.2.5-6 7.5A.2.5-7           7.5A.2.5-9         7.5A.2.5-15         7.5A.2.5-15           7.5A.2.5-15         7.5A.2.5-15         7.5A.2.5-2a ⁵ 7.5A.2.5-35         7.5A.2.5-35         7.5A.2.5-35           7.5A.2.5-35         7.5A.2.5-36         7.5A.2.5-35           7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-35           7.5A.2.5-35         7.5A.2.5-35         7.5A.2.5-36           7.5A.2.5-35         7.5A.2.5-36         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-7         7.5A.2.5-8           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-6           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-7           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-8           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-7           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-7           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-7           7.5A.2.5-9         SCC1, SCC2         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7 <td></td> <td>3'</td> <td></td> <td></td>		3'						
Inter-band         7.5A.2.5-5           12         SCC2         7.5A.2.5-6           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-8           7.5A.2.5-9         7.5A.2.5-13           7.5A.2.5-13         7.5A.2.5-25           7.5A.2.5-145         7.5A.2.5-25           7.5A.2.5-25         7.5A.2.5-25           7.5A.2.5-25         7.5A.2.5-25           7.5A.2.5-26         7.5A.2.5-25           7.5A.2.5-26         7.5A.2.5-26           7.5A.2.5-3a         7.5A.2.5-3           1ntra-band non-contiguous + Inter-band         13         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-9         23         7.5A.2.5-8           23         7.5A.2.5-9         7.5A.2.5-9           23         7.5A.2.5-9         7.5A.2.5-9           23         7.5A.2.5-9         7.5A.2.5-9           NOTE 1:         CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1           NOTE 2:         CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXA-nXB and CA_nXB-NYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.           NOTE 3:         CA configuration ID as defined in "Default Test S				7.5A.2.5-9				
Inter-band         7.5A.2.5-5           12         SCC2         7.5A.2.5-6           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-8           7.5A.2.5-9         7.5A.2.5-15           7.5A.2.5-15         7.5A.2.5-25           7.5A.2.5-25         7.5A.2.5-25           7.5A.2.5-26         7.5A.2.5-25           7.5A.2.5-25         7.5A.2.5-25           7.5A.2.5-26         7.5A.2.5-26           7.5A.2.5-3a ⁵ 7.5A.2.5-3           7.5A.2.5-3         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-9         2 ³ 2 ³ 7.5A.2.5-6           7.5A.2.5-9         7.5A.2.5-7           7.5A.2.5-9         7.5A.2.5-6           2 ³ 7.5A.2.5-6           7.5A.2.5-9         7.5A.2.5-6           7.5A.2.5-9         7.5A.2.5-7           7.5A.2.5-9         7.5A.2.5-8           7.5A.2.5-9         7.5A.2.5-9           NOTE 1:         CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1           NOTE 2:         CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA,	Intra-band contiguous +			7.5A.2.5-4				
1 ⁻² SUC2         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-9           7.5A.2.5-13         7.5A.2.5-13           7.5A.2.5-14         7.5A.2.5-26           7.5A.2.5-26         7.5A.2.5-23           7.5A.2.5-30         7.5A.2.5-26           7.5A.2.5-33         7.5A.2.5-36           7.5A.2.5-34         7.5A.2.5-36           7.5A.2.5-35         7.5A.2.5-36           7.5A.2.5-3         7.5A.2.5-6           7.5A.2.5-6         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-9         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7           7.5A.2.5-7         7.5A.2.5-7           7.5A.2.5-8         7.5A.2.5-7 <td>Inter-band</td> <td></td> <td></td> <td>7.5A.2.5-5</td>	Inter-band			7.5A.2.5-5				
1/.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-9         7.5A.2.5-15         7.5A.2.5-16         7.5A.2.5-16         7.5A.2.5-25         7.5A.2.5-25         7.5A.2.5-26         7.5A.2.5-26         7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-36         7.5A.2.5-6         7.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-8         7.5A.2.5-9         23         23         23         23         7.5A.2.5-8         7.5A.2.5-8         7.5A.2.5-8         7.5A.2.5-8         7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intr		12	8000	7.5A.2.5-6				
22       SCC1, SCC2       7.5A.2.5-9         7.5A.2.5-25       7.5A.2.5-25         7.5A.2.5-26       7.5A.2.5-25         7.5A.2.5-26       7.5A.2.5-26         7.5A.2.5-26       7.5A.2.5-36         7.5A.2.5-36       7.5A.2.5-36         7.5A.2.5-36       7.5A.2.5-36         7.5A.2.5-36       7.5A.2.5-6         7.5A.2.5-6       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-8         23       7.5A.2.5-8         23       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         8       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-8		1-	3002	7.5A.2.5-7				
22       SCC1, SCC2       7.5A.2.5-1 ⁵ 7.5A.2.5-2a ⁵ 7.5A.2.5-2a ⁵ 7.5A.2.5-3 ⁵ 7.5A.2.5-4         7.5A.2.5-4       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-1       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8				7.5A.2.5-8				
22       SCC1, SCC2       7.5A.2.5-26         7.5A.2.5-25       7.5A.2.5-25         7.5A.2.5-26       7.5A.2.5-26         7.5A.2.5-35       7.5A.2.5-35         7.5A.2.5-36       7.5A.2.5-36         7.5A.2.5-36       7.5A.2.5-36         7.5A.2.5-36       7.5A.2.5-36         7.5A.2.5-4       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         23       7.5A.2.5-8         7.5A.2.5-7       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         23       SCC1, SCC2       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       SCC1, SCC2       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       SCC1, SCC2       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       SCC1, SCC2       7.5A.2.5-8         7.5A.2.5-9       SCC1, SCC2       7.5A.2.5-8 <t< td=""><td></td><td></td><td></td><td></td></t<>								
22       SCC1, SCC2       7.5A.2.5-2 ⁵ Intra-band non- contiguous + Inter-band       1 ³ 7.5A.2.5-3 ⁵ Intra-band non- contiguous + Inter-band       1 ³ 7.5A.2.5-4         SCC2       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9         2 ³ 7.5A.2.5-9         2 ³ 7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-6         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra- band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameter				7.5A.2.5-1 ⁵				
2 ² SCC1, SCC2       7.5A.2.5-2a ⁵ Intra-band non- contiguous + Inter-band       1 ³ 7.5A.2.5-3a ⁵ SCC2       7.5A.2.5-3         7.5A.2.5-3       7.5A.2.5-4         SCC2       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-8         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-6         2 ³ 7.5A.2.5-6         2 ³ 7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-6         SCC1, SCC2       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA- nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra- band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.								
Intra-band non- contiguous + Inter-band       1 ³ 7.5A.2.5-3 ⁵ Intra-band non- contiguous + Inter-band       1 ³ 7.5A.2.5-4         SCC2       7.5A.2.5-5         7.5A.2.5-9       7.5A.2.5-6         2 ³ 7.5A.2.5-9         2 ³ 7.5A.2.5-9         2 ³ 7.5A.2.5-6         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-6         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and		22	SCC1, SCC2					
Intra-band non- contiguous + Inter-band       1 ³ 7.5A.2.5-4         Intra-band non- contiguous + Inter-band       7.5A.2.5-5       7.5A.2.5-5         SCC2       7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-9       7.5A.2.5-9         2 ³ 7.5A.2.5-6       7.5A.2.5-6         2 ³ SCC1, SCC2       7.5A.2.5-6         7.5A.2.5-6       7.5A.2.5-7       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-6       7.5A.2.5-6         7.5A.2.5-8       7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-9       SCC1, SCC2       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9       7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1       NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.		2						
Intra-band non- contiguous + Inter-band       1 ³ 7.5A.2.5-4         Contiguous + Inter-band       7.5A.2.5-5         SCC2       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-6         2 ³ 7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.								
contiguous + Inter-band       7.5A.2.5-5         contiguous + Inter-band       7.5A.2.5-6         SCC2       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         23       7.5A.2.5-4         7.5A.2.5-9       7.5A.2.5-5         SCC1, SCC2       7.5A.2.5-6         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-1       7.5A.2.5-6         7.5A.2.5-2       7.5A.2.5-7         7.5A.2.5-3       7.5A.2.5-7         7.5A.2.5-4       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.								
SCC2       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-4         2 ³ 7.5A.2.5-5         7.5A.2.5-6       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-6         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-6         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-7         7.5A.2.5-8       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.		1 ³						
NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.	contiguous + Inter-band							
1.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-9         23         7.5A.2.5-4         7.5A.2.5-5         7.5A.2.5-6         7.5A.2.5-7         7.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-6         7.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-7         7.5A.2.5-8         7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.			SCC2					
23       7.5A.2.5-9         23       7.5A.2.5-4         7.5A.2.5-5       7.5A.2.5-5         7.5A.2.5-6       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.			0002					
23       7.5A.2.5-4         7.5A.2.5-5       7.5A.2.5-5         7.5A.2.5-6       7.5A.2.5-7         7.5A.2.5-7       7.5A.2.5-8         7.5A.2.5-9       7.5A.2.5-9         NOTE 1: CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1       NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4: Test requirements and parameters refer to CA bandwidth D.         NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.								
NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.								
SCC1, SCC2       7.5A.2.5-6         7.5A.2.5-7       7.5A.2.5-7         7.5A.2.5-9       7.5A.2.5-9         NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.		2 ³						
NOTE 1:       CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1         NOTE 2:       CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 3:       CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.         NOTE 4:       Test requirements and parameters refer to CA bandwidth D.         NOTE 5:       Test requirements and parameters refer to CA bandwidth B or C.								
<ul> <li>NOTE 1: CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1</li> <li>NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 4: Test requirements and parameters refer to CA bandwidth D.</li> <li>NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.</li> </ul>			SCC1. SCC2					
<ul> <li>NOTE 1: CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1</li> <li>NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 4: Test requirements and parameters refer to CA bandwidth D.</li> <li>NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.</li> </ul>								
<ul> <li>NOTE 1: CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1</li> <li>NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA- nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra- band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 4: Test requirements and parameters refer to CA bandwidth D.</li> <li>NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.</li> </ul>								
<ul> <li>(Inter-band)" in table 7.3A.2.4.1-1</li> <li>NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 4: Test requirements and parameters refer to CA bandwidth D.</li> <li>NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.</li> </ul>								
<ul> <li>NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXC-YA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 4: Test requirements and parameters refer to CA bandwidth D.</li> <li>NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.</li> </ul>			est Settings for a CA_nXA-nY	A-nZA Configuration				
<ul> <li>nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intra-band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 4: Test requirements and parameters refer to CA bandwidth D.</li> <li>NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.</li> </ul>			et Sattinga for a CA					
<ul> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intraband non-contiguous + Inter-band)" in table 7.3A.2.4.1-1.</li> <li>NOTE 4: Test requirements and parameters refer to CA bandwidth D.</li> <li>NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.</li> </ul>								
band non-contiguous + Inter-band)" in table 7.3A.2.4.1-1. NOTE 4: Test requirements and parameters refer to CA bandwidth D. NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.								
NOTE 4: Test requirements and parameters refer to CA bandwidth D. NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.								
NOTE 5: Test requirements and parameters refer to CA bandwidth B or C.								
				nfiguration (Intra-band				

Table 7.5A.2.4.2-1: Test repetition and measurement configuration

### 7.5A.2.4.3 Message Contents

contiguous)" in table 7.3A.2.4.1-1

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

### 7.5A.2.5 Test Requirement

The throughput of each carrier shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.2.5-2 and 7.5A.2.5-3.

### Table 7.5A.2.5-1: ACS for intra-band contiguous CA with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz

		NR CA bandwidth class					
Rx Parameter	Units	В	С	D			
ACS	dB	26.0	33.0	25.2			

Table 7.5A.2.5-1a: ACS for intra-band contiguous CA with  $F_{DL_{low}}$  < 2700 MHz and  $F_{UL_{low}}$  < 2700 MHz

		NR CA bandwidth class		
Rx Parameter	Units	В	С	
ACS	dB	20.0	17.0	

## Table 7.5A.2.5-2: Test parameters for intra-band contiguous CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 1

Rx Parameter	Units		NR CA bandwidth class						
		В	С	D					
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB					
PInterferer	dBm	Aggregated power + 24.5 dB	Aggregated power + 31.5 dB	Aggregated power + 23.7 dB					
BWInterferer	MHz	20	BW _{channel} CA	50					
FInterferer (offset)	MHz	10 + Foffset	BW _{channel CA}	25 + F _{offset}					
		/	/	/					
		-10 - Foffset	-BWchannel CA	-25 -F _{offset}					
NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.									
NOTE 2: The absolute value of the interferer offset F _{interferer} (offset) shall be further adjusted to $([F_{interferer}]/SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier.									

## Table 7.5A.2.5-2a: Test parameters for intra-band contiguous CA with $F_{DL_low}{<}2700$ MHz and $F_{UL_low}{<}2700$ MHz, case 1

Rx Parameter	Units	NR CA bandwidth class			
		В	С		
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB	REFSENS + 14 dB		
PInterferer	dBm	Aggregated power + 18.5 dB	Aggregated power + 15.5 dB		
BWInterferer	MHz	5	5		
F _{Interferer} (offset)	MHz	2.5 + F _{offset}	2.5 + F _{offset}		
		/	/		
		-2.5 - F _{offset}	-2.5 - F _{offset}		
NOTE 1: The transmitter shall b 7.3.2-3 with P _{CMAX_L,f,c}		dB below P _{CMAX_L,f,c} at the minimum UL clause 6.2.4.	configuration specified in Table		
NOTE 2: The absolute value of	the interfe	rer offset F _{interferer} (offset) shall be furthe	er adjusted to		
$(  F_{\text{interferer}}  / SCS  + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with 15 kHz SCS					
NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG					
Pattern OP.1 FDD/TD	D for the D	L-signal as described in Annex A.5.1.1	/A.5.2.1.		

### Table 7.5A.2.5-3: Test parameters for intra-band contiguous CA with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 2

Rx Parameter	Units		NR CA bandwidth class					
		В	С	D				
Pw in Transmission Bandwidth Configuration, per CC	dBm	-49.5 + 10log(N _{RB,c} /N _{RB_} _{agg} )	-56.5	-48.7 + 10log(N _{RB,c} /N _{RB_agg} )				
PInterferer	dBm	-25	-25	-25				
BWInterferer	MHz	20	BW _{channel} CA	50				
Finterferer (offset)	MHz	10 + F _{offset}	BWchannel CA	25 + F _{offset}				
		/	/	/				
		-10 -F _{offset}	-BW _{channel CA}	-25 -F _{offset}				
NOTE 1: The transm	itter shall	be set to 24 dB belo	bw P _{CMAX_L,f,c} at the	minimum UL configuration spec	ified in Table 7.3.2-3 with			
		clause 6.2.4.						
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $([F_{interferer}   SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the alexant carrier.								
that of the closest carrier. NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.								

### Table 7.5A.2.5-3a: Test parameters for intra-band contiguous CA with F_{DL_low} <2700 MHz and F_{UL_low}<2700 MHz, case 2

Rx Parameter	Units	NR CA Bandwidth Class				
		В	С			
Pw in Transmission Bandwidth Configuration, per CC			-40.5 + 10log(N _{RB,c} /N _{RB_agg} )			
PInterferer	dBm	-25	-25			
BWInterferer	MHz	5	5			
Finterferer (offset)	MHz	2.5 + F _{offset}	2.5 + F _{offset}			
		/	/			
		-2.5 - Foffset	-2.5 - F _{offset}			
NOTE 1: The transmitter shall b	e set to 24	I dB below P _{CMAX_L,f,c} at the minimum U	L configuration specified in Table			
7.3.2-3 with PCMAX_L,f,c	defined in	clause 6.2.4.				
NOTE 2: The absolute value of	the interfe	rer offset F _{interferer} (offset) shall be furthe	er adjusted to			
$\left(\left F_{\text{interferer}}\right  / SCS\right  + 0.5$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in						
MHz. The interferer is an NR signal with 15 kHz SCS.						
NOTE 3: The interferer consists	NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG					
Pattern OP.1 FDD/TD	Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.					

For NR SCC of inter-band and intra-band non-contiguous CA with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.2.5-5 and 7.5A.2.5-6.

Table 7.5A.2.5-4: ACS for NR bands with F _{DL_high} < 2700 MHz and F _{UL_high} < 2700 MHz (inter-band, intra-
band non-contiguous)

RX parameter	Units	Channel bandwidth					
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	
ACS	dB	33	33	30	27	26	
RX parameter	Units	Channel bandwidth					
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	
ACS	dB	25.5	24	23	22.5	21	
RX parameter	Units	Channel bandwidth					
		90 MHz	100 MHz				
ACS	dB	20.5	20				

# Table 7.5A.2.5-5: Test parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz, case 1 (inter-band, intra-band non-contiguous)

RX parameter	Units	Channel bandwidth						
•		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz		
Pw in Transmission Bandwidth Configuration, per CC	dBm		R	EFSENS + 14 d	В			
Pinterferer	dBm	REFSENS	REFSENS	REFSENS	REFSENS	REFSENS		
		for SCC + 45.5 dB	for SCC + 45.5 dB	for SCC + 42.5 dB	for SCC + 39.5 dB	for SCC + 38.5 dB		
BWinterferer	MHz	5	5	5	5	5		
F _{interferer} (offset from SCC)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15		
RX parameter	Units	Ű		hannel bandwid		10		
	•	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Pw in	dBm			EFSENS + 14 d				
Transmission Bandwidth Configuration, per CC								
Pinterferer	dBm	REFSENS	REFSENS	REFSENS	REFSENS	REFSENS		
		for SCC + 38	for SCC +	for SCC +	for SCC + 35	for SCC +		
		dB	36.5 dB	35.5 dB	dB	33.5 dB		
BWinterferer	MHz	5	5	5	5	5		
Finterferer (offset from SCC)	MHz	17.5 /	22.5 /	27.5 /	32.5 /	42.5 /		
RX parameter	Units	-17.5 -22.5 -27.5 -32.5 -42.5 Channel bandwidth						
KA parameter	Units	90 MHz 100 MHz						
Pw in Transmission Bandwidth Configuration, per CC	dBm		S + 14 dB					
Pinterferer	dBm	REFSENS for SCC + 33 dB	REFSENS for SCC + 32.5 dB					
BWinterferer	MHz	5	5					
Finterferer (offset from SCC)	MHz	47.5 / -47.5	52.5 / -52.5					
NOTE 2: The ab $\int  F_{inter} $ The int NOTE 3: The int sided of	7.3.2.3-3 with the solute value $ SCS $ therefore reference of the solution o	all be set to 4dB th $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5) <i>SCS</i> MHz n NR signal with sists of the NR ir	below P _{CMAX_L,f} , ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to nterferer RMC sp	2.4. offset) shall be f b-carrier spacing that of the want pecified in Annex	urther adjusted to g of the wanted s	o ignal in MHz. 3.3.2 with one		

RX parameter	Units	Channel bandwidth						
•		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz		
Pw in Transmission Bandwidth Configuration, per CC	dBm	-56.5	-56.5	-53.5	-50.5	-49.5		
Pinterferer	dBm			-25				
BWinterferer	MHz	5	5	5	5	5		
Finterferer (offset from SCC)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15		
RX parameter	Units			hannel bandwig				
•		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Pw in Transmission Bandwidth Configuration, per CC	dBm	-49	-47	-46.5	-46	-44.5		
Pinterferer	dBm			-25				
BWinterferer	MHz	5	5	5	5	5		
F _{interferer} (offset from SCC)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5		
RX parameter	Units	Channel bandwidth						
		90 MHz	100 MHz					
Pw in Transmission Bandwidth Configuration, per CC	dBm	-44	-43.5					
Pinterferer	dBm	-2	25					
BWinterferer	MHz	5	5					
F _{interferer} (offset from SCC)	MHz	47.5 / -47.5	52.5 / -52.5					
NOTE 2: The at $\left( \begin{bmatrix} F_{inter} \end{bmatrix} \right)$ The int NOTE 3: The int	7.3.2.3-3 wi psolute valu $_{\text{ferer}}   / SCS ]$ terferer is a terferer cons	all be set to 24 c th $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5) <i>SCS</i> MHz n NR signal with sists of the RMC	B below P _{CMAX} ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to specified in Anr	2.4. (offset) shall be f b-carrier spacing o that of the wan nexes A.3.2.2 an	further adjusted to g of the wanted s ted signal.	o ignal in MHz. ne sided		

### Table 7.5A.2.5-6: Test parameters for NR bands with $F_{DL_high} < 2700$ MHz and $F_{UL_high} < 2700$ MHz, case 2 (inter-band, intra-band non-contiguous)

For NR SCC of inter-band and intra-band non-contiguous CA with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.2.5-8 and 7.5A.2.5-9.

### Table 7.5A.2.5-7: ACS for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz (inter-band, intraband non-contiguous)

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
ACS	dB	33	33	33	33	33
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
ACS	dB	33	33	33	33	

# Table 7.5A.2.5-8: Test parameters for NR bands with $F_{DL_{low}} \ge 3300 \text{ MHz}$ and $F_{UL_{low}} \ge 3300 \text{ MHz}$ , case 1 (inter-band, intra-band non-contiguous)

RX parameter	Units		CI	nannel bandwid	th				
-		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz			
Pw in Transmission Bandwidth Configuration, per CC	dBm		R	EFSENS + 14 d	В				
Pinterferer	dBm		REFSENS for SCC + 45.5 dB						
BWinterferer	MHz	10	15	20	40	50			
F _{interferer} (offset from SCC)	MHz	10 / -10	15 / -15	20 / -20	40 / -40	50 / -50			
RX parameter	Units	10		nannel bandwid					
	••••••	60 MHz	80 MHz	90 MHz	100 MHz				
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB							
Pinterferer	dBm	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB				
BWinterferer	MHz	60	80	90	100				
Finterferer (offset from SCC)	MHz	60 / -60	80 / -80	90 / -90	100 / -100				
NOTE 2: The ab $\left( \begin{bmatrix}   F_{inter}   \\ F_{inter} \end{bmatrix} \right)$ The int NOTE 3: The int	7.3.2.3-3 wi psolute value  SCS - terferer is an terferer const	th $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5)SCS MHz n NR signal with sists of the RMC	ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to specified in Ann	2.4. offset) shall be fu b-carrier spacing b that of the want bexes A.3.2.2 and	urther adjusted to of the wanted si	o ignal in MHz. e sided			

### Table 7.5A.2.5-9: Test parameters for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz, case 2 (inter-band, intra-band non-contiguous)

RX parameter	Units		CI	nannel bandwid	lth	
-		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Pw in	dBm					
Transmission						
Bandwidth				-56.5		
Configuration,						
per CC						
Pinterferer	dBm			-25		
BWinterferer	MHz	10	15	20	40	50
Finterferer (offset	MHz	10	15	20	40	50
from SCC)		/	/	/	/	/
-		-10	-15	-20	-40	-50
RX parameter	Units		-	nannel bandwic		
		60 MHz	80 MHz	90 MHz	100 MHz	
Pw in	dBm					
Transmission						
Bandwidth			-56	6.5		
Configuration,						
per CC						
Pinterferer	dBm	-25	-25	-25	-25	
BWinterferer	MHz	60	80	90	100	
Finterferer (offset	MHz	60	80	90	100	
from SCC)		/	/	/	/	
		-60	-80	-90	-100	
					ım UL configurati	on specified in
			ned in clause 6.2			
NOTE 2: The at	solute valu	e of the interfere	r offset Finterferer (	offset) shall be f	urther adjusted to	
$  F_{\text{interf}}  $	$_{\rm ferer}   / SCS  $	+0.5)SCS MHz	with SCS the su	b-carrier spacing	g of the wanted s	ignal in MHz.
The int	terferer is a	n NR signal with	an SCS equal to	that of the wan	ted signal.	
					d A.3.3.2 with on	e sided
					ibed in Annex A.	

### 7.5A.3 Adjacent channel selectivity for 4DL CA

Editor's note: - part content of Table 7.5A.3.4.2-1 is FFS.

### 7.5A.3.1 Test Purpose

Adjacent channel selectivity for 4DL CA verifies the receiver's ability to receive a wanted 4DL carrier aggregated at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel.

7.5A.3.2 Test Applicability

This test case applies to all types of NR UE release 15 and forward that support 4DL CA.

### 7.5A.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.5A.0.

7.5A.3.4 Test Description

7.5A.3.4.1 Initial Conditions

Same as in clause 7.5A.1.4.1 with following exceptions:

- Instead of Table 7.5A.1.4.1-1→ use Table 7.5A.3.4.1-1.
- Instead of Table 7.5A.1.4.1-2 $\rightarrow$  use Table 7.5A.3.4.1-2.
- Instead of Table 7.5A.1.4.1-3→ use Table 7.5A.3.4.1-3.

Table 7.5A.3.4.1-1: Test Configuration Table for 4DL CA

			Do	faul	t Conditions						
Test Envi	ronment a	as specified in			ormal						
	[5] subcla										
Test Freq		s specified in	TS	Intra-band contiguous: Mid range for PCC and SCCs Inter-band CA: NOTE 1, NOTE 5							
30.300-1		use 4.5.1						1 NOTE 5			
					Inter-band + Intra-band contiguous : NOTE 1, NOTE 5 Inter-band + Intra-band non-contiguous : NOTE 1 with						
						and non-contig					
					3A.3.4.1-1(NO						
		on setting (NR			Ų	uous: Lowest	NRB_agg, H	lighest			
		es 5.5A.1-1, 5			RB_agg						
		ses 5.5A.3.x fo cross bandwic			er-band: Highe	a-band contigu	ous · Higho	ot NPR aga			
		upported by th				a-band non-cor					
combinat			002.		RB_agg		inguouo . m	ignoot			
					DTE 6						
		ied in Table 5.	3.5-1		west for PCC a	and SCCs					
Network s	signalling	value			S_01						
						Table 7.3.2.3-4	for the bar	id with active			
			т		link carrier Parameters						
		Do	wnlink Co				Uplink Co	onfiguration			
Test ID	СС	PCC RB	SCC ₁ F		SCC ₂ RB	SCC ₃ RB	CC	PCC RB			
	Mod'n	allocation	allocati		allocation	allocation	Mod'n	allocation			
	Default 7					on (intra-band	d contiguou				
1	CP-	NOTE 1	NOTE	1	NOTE 1	NOTE 1	DFT-s-	NOTE 1			
	OFDM						OFDM				
		et Sottings f		- <b>X</b> A	 -nVA_n7A_nV	A Configurati	QPSK	and)			
1	CP-	NOTE 1	NOTE		NOTE 1	NOTE 1	DFT-s-	NOTE 1			
•	OFDM	NOTET	NOTE	1	NOTET	NOTET	OFDM	NOTET			
	QPSK						QPSK				
Default	t Test Set					-nYA-nZB, CA		, CA_nXC-			
					CA_nXB-nYE tiguous + Inte	B Configuratio	ons				
1	CP-	NOTE 1	NOTE		NOTE 1	NOTE 1	DFT-s-	NOTE 1			
	OFDM						OFDM				
Defeu	QPSK		QPSK QPSK								
	+ Teet Co	ttings for a C	A	V A .	(24) CA =	VA nV(2A) on		$(\lambda) = V(2 \Lambda)$			
Derau	t Test Se	ttings for a C				XA-nY(3A) an		A)-nY(2A)			
Deraul	t Test Se	-		Con	figuration			A)-nY(2A)			
Deraul	t Test Se	-		Con on-c	figuration ontiguous + I			A)-nY(2A)			
	CP- OFDM	(Intra	-band no	Con on-c	figuration ontiguous + I	nter-band)	d CA_nX(2				
1	CP- OFDM QPSK	(Intra NOTE 1	-band no NOTE	Con on-c 1	figuration ontiguous + I NOTE 1	nter-band) NOTE 1	d CA_nX(2 DFT-s- OFDM QPSK	NOTE 1			
1 De	CP- OFDM QPSK fault Tes	(Intra NOTE 1 t Settings for	NOTE	Con on-c 1	figuration ontiguous + I NOTE 1 ) Configuratio	nter-band) NOTE 1 on intra-band	d CA_nX(2 DFT-s- OFDM QPSK non-contig	NOTE 1			
1	CP- OFDM QPSK fault Tes CP-	(Intra NOTE 1	-band no NOTE	Con on-c 1	figuration ontiguous + I NOTE 1	nter-band) NOTE 1	d CA_nX(2 DFT-s- OFDM QPSK non-contig DFT-s-	NOTE 1			
1 De	CP- OFDM QPSK fault Tes CP- OFDM	(Intra NOTE 1 t Settings for	NOTE	Con on-c 1	figuration ontiguous + I NOTE 1 ) Configuratio	nter-band) NOTE 1 on intra-band	d CA_nX(2 DFT-s- OFDM QPSK non-contig DFT-s- OFDM	NOTE 1			
1 De	CP- OFDM QPSK fault Tes CP- OFDM QPSK	(Intra NOTE 1 t Settings for NOTE 1	n-band no NOTE a CA_nX NOTE	<b>Con</b> 1 ((4A) 1	figuration ontiguous + I NOTE 1 ) Configuratio NOTE 1	nter-band) NOTE 1 on intra-band	d CA_nX(2 DFT-s- OFDM QPSK non-contig DFT-s- OFDM QPSK	NOTE 1 uous) NOTE 1			
1 De 	CP- OFDM QPSK fault Tes CP- OFDM QPSK The spectest poin	(Intra NOTE 1 t Settings for NOTE 1 cific configurat	a CA_nX NOTE	Con on-c 1 ((4A) 1 ink a onal	figuration ontiguous + I NOTE 1 ) Configuratio NOTE 1 and downlink a REFSENS re	nter-band) NOTE 1 on intra-band NOTE 1 ire defined in T quirements are	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 a used for A	NOTE 1 uous) NOTE 1 .4.1-1. Only CS.			
1 De 1	CP- OFDM QPSK offault Tes CP- OFDM QPSK The spea test poin CA Conf	(Intra NOTE 1 t Settings for NOTE 1 cific configurat ts verifying no iguration Test	a CA_nX NOTE	Con on-c 1 ((4A) 1 ink a onal	figuration ontiguous + I NOTE 1 ) Configuratio NOTE 1 and downlink a REFSENS re	nter-band) NOTE 1 on intra-band NOTE 1 ire defined in T	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 a used for A	NOTE 1 uous) NOTE 1 .4.1-1. Only CS.			
1 De 1 NOTE 1: NOTE 2:	CP- OFDM QPSK offault Tess CP- OFDM QPSK The speet test poin CA Configur Inter-ba	(Intra NOTE 1 t Settings for NOTE 1 cific configurat ts verifying no iguration Test ation. nd: X,Y,Z,V co	a CA_nX NOTE a CA_nX NOTE ion of upl n-exception CC Comb	Con on-c 1 ((4A) 1 ink a onal bina	Afiguration ontiguous + I NOTE 1 Configuration NOTE 1 And downlink a REFSENS re tion test setting he different ba	nter-band) NOTE 1 n intra-band NOTE 1 ire defined in T quirements are gs are checked unds in the CA	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 used for A separately Configuratio	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g.			
1 De 1 NOTE 1: NOTE 2:	CP- OFDM QPSK offault Tess OFDM QPSK The sper test poin CA Configur Inter-ba for CA_r	(Intra NOTE 1 t Settings for NOTE 1 cific configurat ts verifying no iguration Test ation. nd: X,Y,Z,V co 1A-n3A-n7A-r	a CA_nX NOTE a CA_nX NOTE ion of upl n-exceptic CC Coml prrespond	Con Dn-c 1 ((4A 1 ink a onal bina i to t 1, Y=	And downlink a REFSENS retion test setting he different ba =3, Z=7,V=28;	nter-band) NOTE 1 n intra-band NOTE 1 ire defined in T quirements are gs are checked inds in the CA Intra-band co	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 used for A separately Configuratio	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band:			
1 De 1 NOTE 1: NOTE 2:	CP- OFDM QPSK oFDM QPSK The sper test poin CA Conf Configur Inter-ba for CA_r X,Y,Z co	(Intra NOTE 1 t Settings for NOTE 1 Cific configurat ts verifying no iguration Test ation. nd: X,Y,Z,V co 1A-n3A-n7A-r prrespond to th	a CA_nX NOTE a CA_nX NOTE ion of upl n-exceptic CC Coml prrespond 28A, X= ² e differen	Con on-c 1 ((4A) 1 ink a onal bina I to t 1, Y= t ba	And downlink a REFSENS retion test setting he different ba =3, Z=7,V=28; nds in the CA	nter-band) NOTE 1 NOTE 1 NOTE 1 Intra-band NOTE 1 Intra-band co Configuration,	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 used for A separately Configuration tiguous + E.g. for CA	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band: _n3A-n7B-			
1 De 1 NOTE 1: NOTE 2:	CP- OFDM QPSK oFDM QPSK The spertest poin CA Configur Inter-bar for CA_r X,Y,Z con n28A, X=	(Intra NOTE 1 t Settings for NOTE 1 Cific configurat ts verifying no iguration Test ation. nd: X,Y,Z,V co 1A-n3A-n7A-ro prrespond to th =1,Y=3,z=28;	a CA_nX NOTE a CA_nX NOTE ion of upl n-exceptic CC Coml prrespond 28A, X=1 e differen Intra-ban	Con on-c 1 ((4A) 1 ink a onal bina I to t 1, Y= t ban d no	And downlink a REFSENS re tion test setting he different ba =3, Z=7,V=28; nds in the CA on-contiguous	nter-band) NOTE 1 NOTE 1 NOTE 1 Intra-band NOTE 1 Intra-band co Configuration, s + Inter-band	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 used for A separately Configuration tiguous + E.g. for CA : X,Y,Z corr	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band: _n3A-n7B- respond to			
1 De 1 NOTE 1: NOTE 2:	CP- OFDM QPSK CP- OFDM QPSK The spee test poin CA Conf Configur Inter-ba for CA_r X,Y,Z co n28A, X= the differ	(Intra NOTE 1 t Settings for NOTE 1 iguration Test ation. nd: X,Y,Z,V co 11A-n3A-n7A-r prrespond to th =1,Y=3,z=28; rent bands in t	a CA_nX NOTE a CA_nX NOTE ion of upl n-exceptic CC Coml prrespond 28A, X=1 e differen Intra-ban	Con on-c 1 ((4A) 1 ink a onal bina I to t 1, Y= t ban d no	And downlink a REFSENS re tion test setting he different ba =3, Z=7,V=28; nds in the CA on-contiguous	nter-band) NOTE 1 NOTE 1 NOTE 1 Intra-band NOTE 1 Intra-band co Configuration,	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 used for A separately Configuration tiguous + E.g. for CA : X,Y,Z corr	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band: _n3A-n7B- respond to			
1 1 NOTE 1: NOTE 2: NOTE 3:	CP- OFDM QPSK CP- OFDM QPSK The spea test poin CA Configur Inter-ba for CA_r X,Y,Z co n28A, X= the differ Y=66,Z=	(Intra NOTE 1 t Settings for NOTE 1 its verifying no iguration Test ation. nd: X,Y,Z,V co 1A-n3A-n7A-r prespond to th =1,Y=3,z=28; rent bands in t 77;	a CA_nX NOTE a CA_nX NOTE ion of upl n-exceptic CC Coml orrespond 28A, X= ² e differen intra-ban he CA Co	Con <u>on-c</u> 1 ((4A) 1 ink a onal bina t to t 1, Y= d nc onfig	A contiguous + I NOTE 1 NOTE 1 NOTE 1 NOTE 1 NOTE 1 And downlink a REFSENS retion test setting tion test setting the different ba =3, Z=7,V=28; nds in the CA concontiguous uration. E.g. for	nter-band) NOTE 1 NOTE 1 NOTE 1 Inre defined in T quirements are gs are checked ands in the CA Intra-band co Configuration, s + Inter-band or CA_n2A-n66	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 used for A separately Configuration tiguous + E.g. for CA : X,Y,Z corr SA-n77(2A),	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band: _n3A-n7B- espond to X=2,			
1 De 1 NOTE 1: NOTE 2:	CP- OFDM QPSK GP- OFDM QPSK The spea test poin CA Configur Inter-ba for CA_r X,Y,Z co n28A, X= the differ Y=66,Z= In a band	(Intra NOTE 1 t Settings for NOTE 1 cific configurat ts verifying no iguration Test ation. nd: X,Y,Z,V co n1A-n3A-n7A-r prespond to th =1,Y=3,z=28; rent bands in t 77; d where UE su	a CA_nX NOTE a CA_nX NOTE ion of upl n-exceptic CC Coml orrespond 28A, X= ⁻ e differen Intra-ban he CA Co	Con <u>on-c</u> 1 ((4A) 1 ink a onal bina t to t 1, Y= d nc onfig Rx, ti	A contiguous + I NOTE 1 NOTE 1 O Configuration NOTE 1 A configuration NOTE 1 A configuration NOTE 1 A configuration NOTE 1 A configuration A config	nter-band) NOTE 1 NOTE 1 NOTE 1 Ire defined in T quirements are gs are checked ands in the CA Intra-band co Configuration, s + Inter-band or CA_n2A-n66	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 used for A separately Configuration tiguous + E.g. for CA : X,Y,Z corr SA-n77(2A), ably with 4Rx	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band: _n3A-n7B- espond to X=2, antennas			
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1 De 1 NOTE 1: NOTE 2: NOTE 3: NOTE 4: NOTE 5:	CP- OFDM QPSK ifault Tes CP- OFDM QPSK The spect test poin CA Configur Inter-ba for CA_r X,Y,Z co n28A, X= the differ Y=66,Z= In a band ports con requirem For NR b frequence	(Intra NOTE 1 <b>t Settings for</b> NOTE 1 it settings for NOTE 1 cific configurat ts verifying no iguration Test ation. nd: X,Y,Z,V co 1A-n3A-n7A-1 orrespond to th =1,Y=3,Z=28; 1 rent bands in t 77; d where UE su nected and 4 nents. band n28, 30W cies.	A-band nc NOTE NOTE NOTE NOTE ion of upl n-exceptic CC Coml orrespond 28A, X= ⁻ e differen he CA Co upports 4F Rx REFS IHz test c	Con on-c 1 ((4A) 1 ink a onal bina t to t t baa d nc onfig Rx, ti ENS	Afiguration ontiguous + I NOTE 1 ) Configuration NOTE 1 ) Configuration NOTE 1 and downlink a REFSENS re- tion test setting the different ba- s, Z=7,V=28; nds in the CA on-contiguous uration. E.g. for he test shall ba- S requirement on he lbandwidth	nter-band) NOTE 1 NOTE 1 NOTE 1 Intra-band or defined in T quirements are gs are checked ands in the CA Intra-band co Configuration, s + Inter-band or CA_n2A-n66 e performed or (Table 7.3.2.5- is tested with L	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 e used for A d separately Configuration tiguous + E.g. for CA : X,Y,Z corr SA-n77(2A), ably with 4Rx 2) is used ir _ow range to	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band: _n3A-n7B- espond to X=2, antennas the test est			
1 De 1 NOTE 1: NOTE 2: NOTE 3: NOTE 4: NOTE 5:	CP- OFDM QPSK CP- OFDM QPSK The spect test poin CA Configur Inter-ba for CA_r X,Y,Z co n28A, X= the differ Y=66,Z= In a band ports con requirem For NR b frequence If the UE	(Intra NOTE 1 t Settings for NOTE 1 it Settings for NOTE 1 cific configurat ts verifying no iguration Test ation. nd: X,Y,Z,V co 1A-n3A-n7A-n orrespond to th =1,Y=3,z=28; 1 rent bands in t 77; d where UE su nected and 4 hents. band n28, 30W cies. 5 supports mul	A-band nc NOTE NOTE NOTE ion of upl n-exceptic CC Coml orrespond 28A, X=1 crespond 28A, X=1 e differen he CA Co upports 4F Rx REFS IHz test c	Con on-c 1 ((4A) 1 ink a onal bina t to t t to t t ban d nc onfig Rx, ti ENS hanr	Afiguration ontiguous + I NOTE 1 Configuration NOTE 1 Onfiguration NOTE 1 And downlink a REFSENS re tion test setting the different ba =3, Z=7,V=28; nds in the CA on-contiguous uration. E.g. for he test shall ba S requirement of he loandwidth binations in the	nter-band) NOTE 1 NOTE 1 NOTE 1 Ire defined in T quirements are gs are checked ands in the CA Intra-band co Configuration, s + Inter-band or CA_n2A-n66 e performed or (Table 7.3.2.5-	d CA_nX(2 DFT-s- OFDM QPSK DFT-s- OFDM QPSK able 7.3A.3 e used for A d separately Configuration tiguous + E.g. for CA : X,Y,Z corr SA-n77(2A), ably with 4Rx 2) is used ir -ow range to ation with th	NOTE 1 uous) NOTE 1 .4.1-1. Only CS. for each CA on. E.g. Inter-band: _n3A-n7B- espond to X=2, antennas the test est			

## Table 7.5A.3.4.1-2: Void

## Table 7.5A.3.4.1-3: Void

## 7.5A.3.4.2 Test Procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.1.1. Message contents are defined in clause 7.5A.3.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.5A.3.4.1-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.5A.3.4.2-1 on PCC. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the Downlink signal level according to Table 7.5A.3.4.2-1 as appropriate (Case 1). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.3.4.2-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 7. Set the Interferer signal level to the value as defined in Table 7.5A.3.4.2-1 as appropriate (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal in Case 1 at step 7.
- 10. Set the Downlink signal level according to Table 7.5A.3.4.2-1 as appropriate (Case 2). Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5A.3.4.2-1 for at least the duration of the Throughput measurement, where MU and Uplink power control window size are defined above.
- 11. Set the Interferer signal level to the value as defined in Table 7.5A.3.4.2-1 as appropriate (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 12. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 13. Repeat steps from 10 to 12, using an interfering signal above the wanted signal in Case 2 at step 11.
- 14. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

CA configu	configuration CA configuration ID in REFSENS		Throughput measured on	Table with test parameters to select		
Intra-band contig	guous	14	PCC, SCC1, SCC2,SCC3	TBD		
Inter-band		1 ¹				
		2 ¹ 3 ¹	TBD	TBD		
Intra-band contig	1UOUS +	<u> </u>				
Inter-band	Juo uo .	2 ²	TBD	TBD		
		3 ²				
Intra-band non-		1 ³				
contiguous + Inte	er-band	2 ³ 3 ³	TBD	TBD		
Intra-band non-			TBD			
contiguous			TBD			
			est Settings for a CA_nXA-nY	A-nZA-nVA Configuration		
		ible 7.3A.3.4.1-1.	est Settings for a CA_nXA-nY			
			and CA_nXB-nYB Configura			
		guous + Inter-band)" in table				
			est Settings for a CA_nXA-nາ	'A-nZ(2A), CA_nXA-nY(3A)		
		Y(2A) Configuration				
		contiguous + Inter-band)" in		e e a e e		
		ID as defined in "Default Te ble 7.3A.3.4.1-1.	est Settings for a CA_nXE Co	onliguration (Intra-band		
			est Settings for a CA_nX(4A)	Configuration intra-band		
	non-contiguous)" in table 7.3A.3.4.1-1.					

## 7.5A.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

## 7.5A.3.5 Test Requirement

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.3.5-2, 7.5A.3.5-2a, 7.5A.3.5-3, 7.5A.3.5-3a.

		NR CA bandwidth class				
Rx Parameter	Units	В	С	D		
ACS	dB	26.0	33.0	25.2		

## Table 7.5A.3.5-1a: ACS for intra-band contiguous CA with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz

		NR CA band	lwidth class
Rx Parameter	Units	В	С
ACS	dB	20.0	17.0

## Table 7.5A.3.5-2: Test parameters for intra-band contiguous CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 1

Rx Parameter	Units	NR CA bandwidth class				
		В	С	D		

Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB REFSENS + 14 dB REFSENS + 14 dB					
PInterferer	dBm	Aggregated power + 24.5	Aggregated power + 31.5	Aggregated power + 23.7			
		dB	dB	dB			
BWInterferer	MHz	20 BW _{channel CA} 50					
FInterferer (offset)	MHz	z 10 + Foffset BW _{channel CA}		25 + F _{offset}			
		/	/	/			
		-10 - Foffset	-10 - Foffset -BW _{channel CA} -25 -F _{offset}				
in clause 6.2	1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.						
NOTE 2: The absolut sub-carrier carrier.	e value c spacing c	of the interferer offset F _{interferer} of the carrier closest to the int	(offset) shall be further adjust erferer in MHz. The interferer	ted to $\left( \left  F_{\text{interferer}} \right  / SCS \right  + 0.5$ is an NR signal with an SCS	ⁱ⁾ SCS MHz with SCS the equal to that of the closest		

NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.

## Table 7.5A.3.5-2a: Test parameters for intra-band contiguous CA with $F_{DL_low}{<}2700$ MHz and $F_{UL_low}{<}2700$ MHz, case 1

Rx Parameter	Units	NR CA bandwidth class		
		В	C	
Pw in Transmission Bandwidth	dBm	REFSENS + 14 dB	REFSENS + 14 dB	
Configuration, per CC		REI SENS + 14 dB	REI SENS + 14 dB	
PInterferer	dBm	Aggregated power + 18.5 dB	Aggregated power + 15.5 dB	
BWInterferer	MHz	5	5	
FInterferer (offset)	MHz	2.5 + F _{offset}	2.5 + F _{offset}	
		/	/	
		-2.5 - F _{offset}	-2.5 - F _{offset}	
NOTE 1: The transmitter shall be set to 4 dB below PCMAX_L,f,c at the minimum UL configuration specified in Table				
7.3.2-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.				
NOTE 2: The absolute value of the in		rer offset Finterferer (offset) shall be furthe	er adjusted to	
$\left(\left F_{\text{interferer}}\right /SCS\right +0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MLtz. The interference is an NB eigend with 15 kHz SCS				
		gnal with 15 kHz SCS.		
		MC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG		
Pattern OP.1 FDD/TD	Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.			

# Table 7.5A.3.5-3: Test parameters for intra-band contiguous CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz, case 2

Rx Parameter	Units			NR CA bandwidth class	
		В	С	D	
Pw in Transmission Bandwidth Configuration, per CC	dBm	-49.5 + 10log(N _{RB,c} /N _{RB_} _{agg)}	-56.5	-48.7 + 10log(NRB,c/NRB_agg)	
PInterferer	dBm	-25	-25	-25	
BWInterferer	MHz	20	BW _{channel} CA	50	
F _{Interferer} (offset)	MHz	10 + F _{offset} / -10 -F _{offset}	BW _{channel} CA / -BW _{channel} CA	25 + F _{offset} / -25 -F _{offset}	
P _{CMAX_L,f,c} d NOTE 2: The absolu SCS the su	efined in t te value c b-carrier	be set to 24 dB beic clause 6.2.4. If the interferer offse spacing of the carrie	w P _{CMAX_L,f,c} at the t F _{interferer} (offset) sh	minimum UL configuration spec nall be further adjusted to $\int F_{\text{interminent}}$	ified in Table 7.3.2-3 with $_{ferer}   SCS   + 0.5 SCS$ MHz with an NR signal with an SCS equal to
NOTE 3: The interfe	that of the closest carrier. The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.				

Rx Parameter	Units	NR CA Banc	lwidth Class	
		В	С	
Pw in Transmission Bandwidth Configuration, per CC	dBm	-43.5 + 10log(N _{RB,c} /N _{RB_agg} )	-40.5 + 10log(N _{RB,c} /N _{RB_agg} )	
PInterferer	dBm	-25	-25	
BWInterferer	MHz	5	5	
F _{Interferer} (offset)	MHz	2.5 + F _{offset}	2.5 + F _{offset}	
		/	/	
		-2.5 - F _{offset}	-2.5 - F _{offset}	
NOTE 1: The transmitter shall the 7.3.2-3 with P _{CMAX_L,f,c}		4 dB below P _{CMAX_L,f,c} at the minimum U clause 6.2.4.	L configuration specified in Table	
		rer offset F _{interferer} (offset) shall be furthe Iz with SCS the sub-carrier spacing of t		
	s of the RN	nal with 15 kHz SCS. IC specified in Annexes A.3.2.2 and A.3 DL-signal as described in Annex A.5.1.1		

# Table 7.5A.3.5-3a: Test parameters for intra-band contiguous CA with $F_{DL_low}$ <2700 MHz and $F_{UL_low}$ <2700 MHz, case 2

For NR PCC and SCCs of inter-band and intra-band non-contiguous CA with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.3.5-5 and 7.5A.3.5-6.

## Table 7.5A.3.5-4: ACS for NR bands with F_{DL_high} < 2700 MHz and F_{UL_high} < 2700 MHz (inter-band, intraband non-contiguous)

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
ACS	dB	33	33	30	27	26
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
ACS	dB	25.5	24	23	22.5	21
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
ACS	dB	20.5	20			

Table 7.5A.3.5-5: Test parameters for NR bands with F _{DL_high} < 2700 MHz and F _{UL_high} < 2700 MHz, case
1 (inter-band, intra-band non-contiguous)

RX parameter	Units		C	hannel bandwic	lth	
		5 MHz	5 MHz 10 MHz		20 MHz	25 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm		R	EFSENS + 14 c	В	
Pinterferer	dBm	REFSENS for SCC +	REFSENS for SCC +	REFSENS for SCC +	REFSENS for SCC +	REFSENS for SCC +
		45.5 dB	45.5 dB	42.5 dB	39.5 dB	38.5 dB
BWinterferer	MHz	5	5	5	5	5
F _{interferer} (offset from SCC)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15
RX parameter	Units		CI	hannel bandwic	lth	
•		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm		R	EFSENS + 14 d	В	
Pinterferer	dBm	REFSENS for SCC + 38 dB	REFSENS for SCC + 36.5 dB	REFSENS for SCC + 35.5 dB	REFSENS for SCC + 35 dB	REFSENS for SCC + 33.5 dB
BWinterferer	MHz	5	5	5	5	5
Finterferer (offset from SCC)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5
RX parameter	Units			hannel bandwic		
•		90 MHz	100 MHz			
Pw in Transmission Bandwidth Configuration, per CC	dBm		S + 14 dB			
Pinterferer	dBm	REFSENS for SCC + 33 dB	REFSENS for SCC + 32.5 dB			
BWinterferer	MHz	5	5			
F _{interferer} (offset from SCC)	MHz	47.5 / -47.5	52.5 / -52.5			
NOTE 2: The at $\int  F_{inter} $	7.3.2.3-3 w psolute valu $_{\text{ferer}}   / SCS ]$ terferer is a	ith $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5) <i>SCS</i> MHz n NR signal with	ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to	2.4. offset) shall be f b-carrier spacing o that of the wan	urther adjusted to g of the wanted s	o ignal in MHz.
	dynamic O0 1/A.5.2.1.	CNG Pattern OP.	1 FDD/TDD for t	he DL-signal as	described in Anr	iex

RX parameter	Units	Channel bandwidth						
•		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz		
Pw in Transmission Bandwidth Configuration, per CC	dBm	-56.5	-56.5	-53.5	-50.5	-49.5		
Pinterferer	dBm			-25		•		
BWinterferer	MHz	5	5	5	5	5		
Finterferer (offset	MHz	5	7.5	10	12.5	15		
from SCC)		/	/	/	/	/		
		-5	-7.5	-10	-12.5	-15		
RX parameter	Units			hannel bandwig				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Pw in Transmission Bandwidth Configuration, per CC	dBm	-49	-47	-46.5	-46	-44.5		
Pinterferer	dBm		-25					
BWinterferer	MHz	5	5	5	5	5		
Finterferer (offset	MHz	17.5	22.5	27.5	32.5	42.5		
from SCC)		/	/	/	/	/		
-		-17.5	-22.5	-27.5	-32.5	-42.5		
RX parameter	Units	Channel bandwidth						
		90 MHz	100 MHz					
Pw in Transmission Bandwidth Configuration, per CC	dBm	-44	-43.5					
Pinterferer	dBm	-2	25					
BWinterferer	MHz	5	5					
Finterferer (offset	MHz	47.5	52.5					
from SCC)		/	/					
Table NOTE 2: The at	7.3.2.3-3 wi osolute valu	th P _{CMAX_L,f,c} define the interfere	ned in clause 6.2 r offset F _{interferer} (	2.4. (offset) shall be f	um UL configurat further adjusted t g of the wanted s	0		
The in NOTE 3: The in	terferer is a terferer con	n NR signal with sists of the RMC	an SCS equal to specified in Anr	o that of the wan nexes A.3.2.2 an	ted signal.	e sided		

## Table 7.5A.3.5-6: Test parameters for NR bands with $F_{DL_high} < 2700$ MHz and $F_{UL_high} < 2700$ MHz, case 2 (inter-band, intra-band non-contiguous)

For NR PCC and SCCs of inter-band and intra-band non-contiguous CA with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.3.5-8 and 7.5A.3.5-9.

## Table 7.5A.3.5-7: ACS for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz (inter-band, intraband non-contiguous)

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
ACS	dB	33	33	33	33	33
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
ACS	dB	33	33	33	33	

## Table 7.5A.3.5-8: Test parameters for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz, case 1 (inter-band,intra-band non-contiguous)

RX parameter	Units		CI	hannel bandwid	lth	
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm		R	EFSENS + 14 d	В	
Pinterferer	dBm		REFSI	ENS for SCC + 4	5.5 dB	
BWinterferer	MHz	10	15	20	40	50
F _{interferer} (offset from SCC)	MHz	10 /	15 /	20 /	40 /	50 /
DV	l los ita	-10	-15	-20	-40	-50
RX parameter	Units	60 MHz	80 MHz	hannel bandwid 90 MHz	100 MHz	
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB				
Pinterferer	dBm	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	REFSENS for SCC + 45.5 dB	
BWinterferer	MHz	60	80	90	100	
F _{interferer} (offset from SCC)	MHz	60 / -60	80 / -80	90 / -90	100 / -100	
NOTE 2: The ab $\left( \begin{bmatrix}   F_{inter} \\ The int \end{bmatrix} \right)$ NOTE 3: The int	7.3.2.3-3 wi psolute value $_{\text{ferer}}   / SCS ]$ terferer is a terferer const	th $P_{CMAX_L,f,c}$ defi e of the interfere + 0.5)SCS MHz n NR signal with sists of the RMC	ned in clause 6.2 r offset F _{interferer} ( with SCS the su an SCS equal to specified in Ann	2.4. offset) shall be fi b-carrier spacing that of the want nexes A.3.2.2 and	urther adjusted to g of the wanted s	o ignal in MHz. e sided

## Table 7.5A.3.5-9: Test parameters for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 2 (inter-band, intra-band non-contiguous)

RX parameter	Units		Cł	nannel bandwig	lth		
-		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz	
Pw in	dBm						
Transmission							
Bandwidth				-56.5			
Configuration,							
per CC							
Pinterferer	dBm			-25			
BWinterferer	MHz	10	15	20	40	50	
Finterferer (offset	MHz	10	15	20	40	50	
from SCC)		/	/	/	/	/	
		-10	-15	-20	-40	-50	
RX parameter	Units			nannel bandwig			
		60 MHz	80 MHz	90 MHz	100 MHz		
Pw in	dBm						
Transmission							
Bandwidth			-56	6.5			
Configuration,							
per CC							
Pinterferer	dBm	-25	-25	-25	-25		
BWinterferer	MHz	60	80	90	100		
Finterferer (offset	MHz	60	80	90	100		
from SCC)		/	/	/	/		
		-60	-80	-90	-100		
NOTE 1: The tra					ım UL configurati	on specified in	
			ned in clause 6.2				
					urther adjusted to		
$  F_{\text{interf}}  $	$\left(\left F_{\text{interferer}}\right /SCS\right] + 0.5$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.						
The int	The interferer is an NR signal with an SCS equal to that of the wanted signal.						
					d A.3.3.2 with on	e sided	
					ibed in Annex A.		

## 7.5B Adjacent channel selectivity for NR-DC

For inter-band NR-DC configurations, the adjacent channel selectivity for the corresponding inter-band CA configuration as specified in clause 7.5A applies.

Note: For NR-DC testing, replace CA by NR-DC, PCC by PCell, and SCC by PSCell in clause 7.5A.

## 7.5D Adjacent channel selectivity for UL MIMO

## 7.5D.1 Test purpose

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

## 7.5D.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

## 7.5D.3 Minimum conformance requirements

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in sub-clause 7.5 shall be met with the UL MIMO configurations described in sub-clause 6.2D.1. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.5D and 7.5.

## 7.5D.4 Test description

## 7.5D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.2-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.5D.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and Annex A.3 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions						
Test Envi	onment as specified in T	S	Normal			
38.508-1	5] subclause 4.1					
Test Freq	uencies as specified in T	S	Mid range			
38.508-1	5] subclause 4.3.1		_			
Test Char	nnel Bandwidths as speci	fied in	Lowest, Mid a	and Highest		
	3-1 [5] subclause 4.3.1			-		
Test SCS	as specified in Table 5.3	.5-1	Lowest			
		Т	est Parameter	S		
	Downlink Co	onfigura	tion	Uplink Config	guration	
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation	
1	CP-OFDM QPSK	1	NOTE 1	CP-OFDM QPSK	NOTE 1	
NOTE 1:	The specific configuration	on of upl	ink and downlir	nk are defined in Table 7.	.3.2.4.1-2 and	
	7.3.2.4.1-3 for Downlink and Uplink respectively.					
NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas						
	ports connected and 4R requirements.	x REFS	ENS requireme	ent (Table 7.3.2.5-2) is us	ed in the test	

## Table 7.5D.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.4 for TE diagram and section A.3.2.3 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.5D.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* and Test Loop Function On according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.5D.4.3.

7.5D.4.2 Test procedure

Same test procedure as specified in 7.5.2.4.2 with the following exception:

- Instead of Table 7.5.4.1-1, use Table 7.5D.4.1-1 in step 1.
- Step 2: SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.5D.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. The PDCCH DCI format 0_1 is specified with condition 2TX_UL_MIMO in 38.508-1 [5] subclause 4.3.6.1.1.2.

## 7.5D.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO

## 7.5D.5 Test requirement

Same test requirement as defined in Clause 7.5.5.

## 7.5F Adjacent channel selectivity

## 7.5F.1 Adjacent channel selectivity for shared spectrum channel access

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Test Configuration Table is FFS
- Message content for NS_53 is FFS
- TP analysis is TBD
- TT for 5.925GHz  ${<}\,f{\le}\,7.125GHz$  is TBD

## 7.5F.1.1 Test purpose

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

## 7.5F.1.2 Test applicability

This test case applies to all types of NR UE release 16 and forward that support NR standalone shared spectrum channel access.

7.5F.1.3 Minimum conformance requirements

Instead of the general ACS requirements specified in clause 7.5, the UE shall fulfil the minimum requirements specified in Table 7.5F.1.3-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.5F.1.3-2, the throughput shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## Table 7.5F.1.3-1: ACS for shared spectrum channel access bands

RX parameter	Units	Channel bandwidth			
		20 MHz	40 MHz	60 MHz	80 MHz
ACS	dB	24	21	19.2	18

RX param	eter	Units		Channel k	pandwidth			
			20 MHz	40 MHz	60 MHz	80 MHz		
Power i	n	dBm	REFSENS + 14 dB					
transmiss								
bandwid								
configurat								
Pinterfere	r	dBm	REFSENS +	REFSENS +	REFSENS +	REFSENS +		
			36.5 dB	33.5 dB	31.7 dB	30.5 dB		
BWinterfer	-	MHz			0			
Finterferer (of	/	MHz			-20			
			all be set to 4 dE					
			cified in Table 7.3					
			e of the interfere					
t	$0 \left( \left  F_{i} \right  \right)$	nterferer / SCS	$S \rightarrow 0.5$ SCS MH	Iz with SCS the s	sub-carrier spaci	ng of the		
\ \	wanted	nted signal in MHz. The interferer is an NR signal with an SCS equal to that of						
t	he wa	nted signal.						
NOTE 3:	The int	terferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with						
0	one sid	ded dynami	c OCNG Pattern	OP.1 FDD/TDD	for the DL-signa	al as described		
i	n Ann	ex A.5.1.1//	A.5.2.1.		-			

## Table 7.5F.1.3-2: Test parameters for shared spectrum channel access bands

The normative reference for this requirement is TS 38.101-1 [2] clause 7.5F.1.

7.5F.1.4 Test description

## 7.5F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.5F1..4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

## Table 7.5F.1.4.1-1: Test Configuration Table

## FFS

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.1 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.5F.1.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.5F.1.4.3.

## 7.5F.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format [1_1] for C_RNTI to transmit the DL RMC according to Table 7.5F.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.5F.1.4.1-1. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 3. Set the Downlink signal level to the value as defined in Table 7.5F.1.5-2. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.5F.1.5-2 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified in Table F.1.3-1.
- 4. Set the Interferer signal level to the value as defined in Table 7.5F.1.5-2 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D.
- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## 7.5F.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

## 7.5F.1.5 Test requirement

For NR bands under test, the throughput measurement derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5F.1.5-2.

Table 7.5F.1.5-1: ACS for shared spectrum channel access bands

RX parameter	Units	Channel bandwidth			
		20 MHz	40 MHz	60 MHz	80 MHz
ACS	dB	24	21	19.2	18

RX parameter	Units		Channel k	pandwidth			
-		20 MHz	20 MHz 40 MHz 60 MHz				
Power in	dBm	REFSENS + 14 dB					
transmission							
bandwidth							
configuration							
Pinterferer	dBm	REFSENS +	REFSENS +	REFSENS +	REFSENS +		
		36.5 dB	33.5 dB	31.7 dB	30.5 dB		
BWinterferer	MHz	20					
Finterferer (offset)	MHz		= • 1	-20			
NOTE 1: The tr							
				L,f,c defined in cla			
NOTE 2: The a							
to ([]	interferer / SCS	[]+0.5)SCS MH	Iz with SCS the s	sub-carrier spaci	ng of the		
wante	anted signal in MHz. The interferer is an NR signal with an SCS equal to that of						
	anted signal.						
NOTE 3: The in	nterferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with						
one si	ded dynami	c OCNG Pattern	OP.1 FDD/TDD	for the DL-signa	al as described		
in Anr	nex A.5.1.1//	A.5.2.1.		-			

## 7.6 Blocking characteristics

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

## 7.6.1 General

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

FFS

## 7.6.2 In-band blocking

## 7.6.2.1 Test purpose

In band blocking is defined for an unwanted interfering signal falling into the range from 15 MHz below to 15 MHz above the UE receive band, with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, or into an immediately adjacent frequency range up 3CBW below or above the UE receive band, with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, at which the relative throughput shall meet or exceed the requirement for the specified measurement channel.

## 7.6.2.2 Test applicability

This test applies to all types of NR UE release 15 and forward.

## 7.6.2.3 Minimum conformance requirements

For NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, in-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL signal as described in Annex A.5) with parameters specified in Table 7.6.2.3-1 and Table 7.6.2.3-2. The relative throughput shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

## Table 7.6.2.3-1: In-band blocking parameters for NR bands with FDL_high < 2700 MHz and FUL_high < 2700 MHz

RX parameter	Units		Channel bandwidth (MHz)					
		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100				
Power in transmission bandwidth configuration ³	dBm	REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB				
BWinterferer	MHz		5					
Floffset, case 1	MHz			7.5				
Floffset, case 2	MHz			12.5				
Table	NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.							
NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz SCS.								
NOTE 3 10log1	o(x) is round	led to the next h	igher 0.5dB valu	е.				

## Table 7.6.2.3-2: In-band blocking for NR bands with $F_{\text{DL}_high}$ < 2700 MHz and $F_{\text{UL}_high}$ < 2700 MHz

$\begin{array}{ c c c c c c } \hline P_{\text{Interferer}} & dBm & -56 & -44 & -15 & -38 \\ \hline F_{\text{Interferer}} (offset) & MHz & PW_{\text{Channel}/2-} & \leq PW_{\text{Channel}/2-} \\ \hline F_{\text{Ioffset, case 1}} & -BW_{\text{Channel}/2-} \\ \hline F_{\text{Ioffset, case 2}} & and \\ BW_{\text{Channel}/2} & \geq BW_{\text{Channel}/2} & + \\ \hline F_{\text{Ioffset, case 2}} & and \\ BW_{\text{Channel}/2} & \geq BW_{\text{Channel}/2} & + \\ \hline F_{\text{Ioffset, case 1}} & BW_{\text{Channel}/2} & + \\ \hline F_{\text{Ioffset, case 1}} & F_{\text{Ioffset}, case 2} & and \\ BW_{\text{Channel}/2} & + \\ \hline F_{\text{Ioffset, case 2}} & and \\ BW_{\text{Channel}/2} & + \\ \hline F_{\text{Ioffset, case 2}} & and \\ \hline F_{\text{DL}_{-}\text{Iog}} & + 15 \\ \hline f_{\text{Iof}} & f$	NR band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4		
Findfield, case 1 and     Findfield, case 2 and       n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n39, n40, n41, n40, n41, n40, n41, n40, n41, n76, n85     Findfield, case 2 Findfield, case 2 to       n20, n24, n25, n26, n28, n39, n40, n41, n40, n41, n41, n41, n41, n41, n41, n41, n41,		Pinterferer	dBm	-56	-44	-15	-38		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		Finterferer (offset)	MHz	Floffset, case 1	Floffset, case 2		-BW _{Channel} /2-11		
Image: Constraint of the second se									
n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n34, n38, n39, n40, n41, n40, n41, n43, n50, n51, n53, n51, n53, n66, n67, n70, n74, n75, n76, n85       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_low - 15 to FDL_low - 15 to FDL_low - 11         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_low - 12 to FD									
n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n34, n38, n39, n40, n41, n483, n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85to to Hzto FDL_bigh + 15n71FinterfererMHzNOTE 2FDL_low - 15 FDL_high + 15FDL_low - 12 FDL_high + 15n71FinterfererMHzNOTE 2FDL_low - 12 to FDL_high + 15FDL_low - 12 FDL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Finterferer]/SCS] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BWChannel/2 - Floftset, case 1; b: BWChannel/2 + Floftset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause	1 0 0	-							
n12, n13, n14, n18, n20, n24, n25, n26, n28,n34, n38,n39, n40, n41, n48, n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85FDL_high + 15n30FinterfererMHzNOTE 2 $FDL_low - 15$ $FDL_high + 15$ $FDL_low - 11$ to $FDL_high + 15$ n71FinterfererMHzNOTE 2 $FDL_low - 12$ $FDL_high + 15$ $FDL_low - 12$ $FDL_high + 15$ NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS] + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW_Channel/2 - Forfset, case 1; b: BW_Channel/2 + Fioffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause		Finterferer	MHZ	NOTE 2	-				
n14, n18,       n20, n24,         n25, n26,       n28,n34,         n38,n39,       n40, n41,         n48*, n50,       n51, n53,         n65, n66,       n66,         n77, n70,       n74, n75,         n76, n85       n71         Finterferer       MHz       NOTE 2         FDL_low - 15       to         n71       Finterferer         MHz       NOTE 2         FDL_low - 12 to       FDL_low - 12         FOL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to         ( $  F_{interferer}  / SCS    + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW_{Channel/2 - Floifset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
n20, n24, n25, n26, n28,n34, n38,n39, n40, n41, n483, n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85HzNOTE 2FDL_low - 15 to FDL_high + 15FDL_low - 11 to FDL_high + 15n71FinterfererMHzNOTE 2FDL_low - 12 to FDL_high + 15FDL_low - 12 to TOL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}]/SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BWChannel/2 - Fioftset, case 1; b: BWChannel/2 + Floftset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause					FDL_high + 15				
n25, n26, n28,n34, n38,n39, n40, n41, n48, n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85Image: constraint of the state of the stat									
n28,n34, n38,n39, n40, n41, n48 ³ , n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85       MHz       NOTE 2 $F_{DL_low} - 15$ to $F_{DL_high} + 15$ $F_{DL_low} - 12$ n30       Finterferer       MHz       NOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ n71       Finterferer       MHz       NOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS ] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 – Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
n40, n41, n48 ³ , n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 11         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 12         n71       Finterferer       MHz       NOTE 2       FDL_low - 12 to FDL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([ F _{interferer}  /SCS] + 0.5)SCS       MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 – Flotfset, case 1; b: BW _{Channel} /2 + Flotfset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
n48 ³ , n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 11         n30       Finterferer       MHz       NOTE 2       FDL_high + 15 FDL_high + 15       FDL_low - 12         n71       Finterferer       MHz       NOTE 2       FDL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Finterferer   / SCS] + 0.5) SCS       MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 - Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
n51, n53, n65, n66, n67, n70, n74, n75, n76, n85MHzNOTE 2 $F_{DL_low} - 15$ to $F_{DL_high} + 15$ $F_{DL_low} - 11$ n30FinterfererMHzNOTE 2 $F_{DL_low} - 15$ to $F_{DL_high} + 15$ $F_{DL_low} - 12$ $F_{DL_high} + 15$ n71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS ] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW_{Channel}/2 - Floffset, case 1; b: BW_{Channel}/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
n65, n66, n67, n70, n74, n75, n76, n85n67, n70, n76, n85n70, n76, n85n71FinterfererMHzNOTE 2 $F_{DL_low} - 15$ to $F_{DL_high} + 15$ $F_{DL_low} - 11$ n30FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ $F_{DL_high} + 15$ n71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS ] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW_{Channel}/2 - Floffset, case 1; b: BW_{Channel}/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
n74, n75, n76, n85MHzNOTE 2 $F_{DL_low} - 15$ to FDL_high + 15 $F_{DL_low} - 11$ n30FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ FDL_high + 15n71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ FDL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}]/SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BWChannel/2 - Floffset, case 1; b: BWChannel/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
n30FinterfererMHzNOTE 2FDL_low - 15 to FDL_high + 15FDL_low - 11n71FinterfererMHzNOTE 2FDL_low - 12 to FDL_high + 15FDL_low - 12NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}]/SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BWChannel/2 - Floffset, case 1; b: BWChannel/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
n71       Finterferer       MHz       NOTE 2       FDL_low - 12 to FDL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Finterferer]/SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 – Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause		Finterferer	MHz	NOTE 2			F _{DL_low} – 11		
n71       Finterferer       MHz       NOTE 2       FDL_low - 12 to FDL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Finterferer]/SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 – Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause					F _{DL_high} + 15				
NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([F _{interferer} ]/SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.          NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 – Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1          NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause	n71	Finterferer	MHz	NOTE 2		F _{DL_low} – 12			
<ul> <li>([ F_{interferer} /SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.</li> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW_{Channel}/2 - Floffset, case 1; b: BW_{Channel}/2 + Floffset, case 1</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>					F _{DL_high} + 15	_			
NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 – Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1 NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause	NOTE 1: T	NOTE 1: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to							
NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 – Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1 NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause		$ F_{\text{interferer}} /SCS  + 0$	).5) <i>SCS</i> _M	Hz with SCS the cut	corrier enacing of th	o wanted signal in l	MHz The interferer		
<ul> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW_{Channel}/2 – Floffset, case 1; b: BW_{Channel}/2 + Floffset, case 1</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>		is on NP signal with 15 kHz SCS							
Floffset, case 1; b: BW _{Channel} /2 + Floffset, case 1 NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause		IS AN INK SIGNAL WITH 15 KHZ SCS.							
NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause									
					according to the ge	neral requirement d	ofined in Clause		
7.1.		•		and nequency fallye	according to the ge		enned in Clause		

For NR bands with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, in-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into an immediately adjacent frequency range up to 3CBW below or above the UE receive band where CBW is the bandwidth of the wanted signal. The throughput of the wanted signal shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.2.3-3 and Table 7.6.2.3-4. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

## Table 7.6.2.3-3: In-band blocking parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

RX parameter	Channel bandwidth (MHz)						
		10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100					
Power in							
transmission	dBm	REFSENS + 6 dB					
bandwidth	UDIII	REFSENS + 0 UD					
configuration							
BWinterferer	MHz	BW _{Channel}					
Floffset, case 1	MHz	(3/2)*BW _{Channel}					
Floffset, case 2	MHz	(5/2)*BW _{Channel}					
NOTE 1: The tra	NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in						
Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.							
NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided							
dynam	nic OCNG P	attern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1					

## Table 7.6.2.3-4: In-band blocking for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
n77, n78,	Finterferer (offset)	MHz	-BW _{Channel} /2 -	≤ -BW _{Channel} /2 –			
n79			Floffset, case 1	Floffset, case 2			
			and	and			
			BW _{Channel} /2 +	≥ BW _{Channel} /2 +			
			Floffset, case 1	Floffset, case 2			
	Finterferer		NOTE 2	F _{DL_low} –			
				3*BWChannel			
				to			
				FDL_high +			
				3*BW _{Channel}			
NOTE 1:	The absolute value of further adjusted to (						
	sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.						
NOTE 2:	For each carrier freq	uency, the	e requirement applies	s for two interferer			
	carrier frequencies: a: -BWchannel/2 - Floffset, case 1; b: BWchannel/2 +						
	Floffset, case 1						
NOTE 3:	BW _{Channel} denotes th	e channel	bandwidth of the wa	nted signal			

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6.2.

7.6.2.4 Test description

## 7.6.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.6.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

	Default Conditions					
	Test Environment as specified in TS 38.508-1 [5] subclause 4.1					
	Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1			OTE 4)		
Test Channel Bandwidths as specified in TS 38.508-1 [5] subclause 4.3.1			Lowest, Mid, Highest Lowest UL / Lowest DL, Lowest UL / Highest DL (NOTE 3)			
Test SCS as specified in Table 5.3.5-1			Lowest			
	Test Parameters					
	Downlink Co	onfigura	tion Uplink Configuration			
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation	
1	CP-OFDM QPSK	1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1	
	<ul> <li>NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3.2.4.1-1.</li> <li>NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.</li> </ul>					
	<ul> <li>NOTE 3: Additional test points selected according to asymmetric channel bandwidths specified in clause 5.3.6. DL channel bandwidth shall be selected first.</li> <li>NOTE 4: For NR band n28, 30MHz test channel bandwidth is tested with Low range test frequencies.</li> </ul>					

## Table 7.6.2.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.1 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.6.2.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.6.2.4.3.

## 7.6.2.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6.2.4.1-1. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 3. Set the parameters of the signal generator for an interfering signal below the wanted signal in Case 1 according to Tables 7.6.2.5-1 and 7.6.2.5-2 or Tables 7.6.2.5-3 and 7.6.2.5-4 as appropriate depending on NR band.
- 4. Set the downlink signal level according to the table 7.6.2.5-1 or 7.6.2.5-3 as appropriate. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6.2.5-1 or Table 7.6.2.5-3 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS

38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.

- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
- 6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 3.
- 7. Repeat steps from 3 to 6, using interfering signals in Case 2 at step 3and 6. The ranges of case 2 are covered in steps equal to the interferer bandwidth. Interferer frequencies should be chosen starting with an offset nearest to the centre frequency and sweep outwards towards the band edges. In order to ensure that full range is tested for interferer frequency, run last test steps at frequency equal to F_{Interferer} range limit defined at the corresponding band edge.
- 8. If applicable based on NR band, repeat steps from 3 to 5, using interfering signals in Case 3 at step 3.
- 9. If applicable based on NR band, repeat steps from 3 to 5, using interfering signals in Case 4 at step 3.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

#### 7.6.2.5 Test requirement

For NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex in Annexes A.2.2, A.2.3 and A.3.2 with parameters specified in Tables 7.6.2.5-1 and 7.6.2.5-2.

## Table 7.6.2.5-1: In-band blocking parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

RX parameter	Units		Chan	nel bandwidth (MHz)			
		5, 10 15		20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
Power in transmission bandwidth configuration ³	dBm	REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB			
BWinterferer	MHz	5					
Floffset, case 1	MHz		7.5				
Floffset, case 2	MHz	12.5					
Table	Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.						
NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz SCS.							
NOTE 3: 10log1	o(x) is round	led to the next h	igher 0.5dB valu	е.			

## Table 7.6.2.5-2: In-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

NR band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4		
	Pinterferer	dBm	-56	-44	-15	-38		
	Finterferer (offset)	MHz	-BW _{Channel} /2 – Floffset, case 1 and BW _{Channel} /2 + Floffset, case 1	≤ -BW _{Channel} /2 – Floffset, case 2 and ≥ BW _{Channel} /2 + Floffset, case 2		-BW _{Channel} /2-11		
n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28,n34, n38,n39, n40, n41, n48 ³ , n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85	Finterferer	MHz	NOTE 2	F _{DL_low} – 15 to F _{DL_high} + 15				
n30	Finterferer	MHz	NOTE 2	F _{DL_low} – 15 to F _{DL_high} + 15		F _{DL_low} – 11		
n71	Finterferer	MHz	NOTE 2	F _{DL_low} – 12 to F _{DL_high} + 15	F _{DL_low} – 12			
NOTE 1: T	The absolute value $ F_{\text{interferer}}  / SCS + 0$	of the inter $(0.5)SCS$	ferer offset Finterfer	er (offset) shall be fur	ther adjusted to	MUz. The interferer		
ic	$\left(\left F_{\text{interferer}}\right /SCS\right +0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.							
NOTE 2: F	IS ALL INK SIGNAL WITH TO KEEZ SCS.							
NOTE 3: n				e according to the ger	eral requirement d	efined in Clause		

For NR bands with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.2 and A.3 with parameters specified in Tables 7.6.2.5-3 and 7.6.2.5-4.

## Table 7.6.2.5-3: In-band blocking parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

RX paramete	r Units	Channel bandwidth (MHz)					
		10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100					
Power in transmission bandwidth configuration		REFSENS + 6 dB					
BW _{interferer} MHz		BW _{Channel}					
Floffset, case 1	MHz	(3/2)*BWChannel					
Floffset, case 2	MHz	(5/2)*BW _{Channel}					
		hall be set to 4 dB below $P_{CMAX_L,f,c}$ at the minimum UL configuration specified in					
Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.							
	NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1						

NR band	Parameter	Unit	Case 1	Case 2		
	Pinterferer	dBm	-56	-44		
n77, n78,	Finterferer (offset)	MHz	-BW _{Channel} /2 –	≤ -BW _{Channel} /2 –		
n79			Floffset, case 1	Floffset, case 2		
			and	and		
			BW _{Channel} /2 +	≥ BW _{Channel} /2 +		
			Floffset, case 1	Floffset, case 2		
	Finterferer		NOTE 2	F _{DL_low} –		
				3*BW _{Channel}		
				to		
				F _{DL_high} +		
				3*BWChannel		
			ferer offset Finterfere $SCS \mid + 0.5 SCS \mid MH$			
sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.						
NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BW _{Channel} /2 - F _{loffset, case 1} ; b: BW _{Channel} /2 + F _{loffset, case 1}						
NOTE 3:	BWChannel denotes th	e channel	bandwidth of the wa	nted signal		

## Table 7.6.2.5-4: In-band blocking for NR bands with $F_{DL_{low}} \ge 3300 \text{ MHz}$ and $F_{UL_{low}} \ge 3300 \text{ MHz}$

## Table 7.6.2.5-5: Void

## 7.6.3 Out-of-band blocking

## 7.6.3.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 15 MHz below or above the UE receive band, with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, or falling outside a frequency range up to 3*BW_{Channel} below or from 3*BW_{Channel} above the UE receive band, with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

## 7.6.3.2 Test Applicability

This test applies to all types of NR UE release 15 and forward.

## 7.6.3.3 Minimum Conformance Requirements

For NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3.3-1 and Table 7.6.3.3-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

## Table 7.6.3.3-1: Out-of-band blocking parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

RX parameter	Units	Channel bandwidth (MHz)					
			15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
Power in transmission bandwidth configuration ²		REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB			
NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3.3 with Power configuration defined in clause 6.2.4							
	Table 7.3.2.3-3 with $P_{CMAX_L,f,c}$ defined in clause 6.2.4. NOTE 2: 10log ₁₀ (x) is rounded to the next higher 0.5dB value.						

NR band	Parameter	Unit	Range 1	Range 2	Range 3		
n1, n2, n3,	Pinterferer	dBm	-44	-30	-15		
n5, n7, n8,	Finterferer (CW)	MHz					
n12, n14,							
n20, n24,							
n25, n26,							
n30, n28,					$1 \le f \le F_{DL_{low}} - 85$		
n34, n38,			-60 < f – F _{DL_low} < -15	-85 < f – F _{DL_low} ≤ -60	or		
n39, n40,			or	or	F _{DL high} + 85 ≤ f		
n41, n48 ⁵ ,			15 < f - F _{DL_high} < 60	60 ≤ f – F _{DL_high} < 85	≤ 12750		
n50, n51,					= 12700		
n53 ⁸ , n65,							
n66, n70,							
n71, n74,							
n75, n76							
		ne interfere	er (P _{Interferer} ) for Range 3	shall be modified to -20 (	DBM for FInterferer >		
	6000 MHz.		d EQ is applied as E-	for band 51 Ear band 6	0 the E of hand		
	51 is applied as $F_{DL}$		d 50 is applied as F _{DL_hig}	h IOI Daliu ST. FOI Daliu S	bu, the FDL_low of ballu		
				for bond 76 Ear bond	75 the East of bond		
NOIE 3. I	76 is applied as $F_{DL}$	high OI Dall	d 75 is applied as F _{DL_hig}	h IOI Dallu 76. FOI Dallu 7	5, the FDL_low of band		
			s 38 and 41, the F _{DL_high} a	and Epu us of band 41 is	applied as Epulsiand		
	$F_{DL low}$ for band 38.	Juli Danu	S 50 and 41, the T DL_high a		applied as I DL_nign allu		
	n48 follows the requirement in this frequency range according to the general requirement defined in						
	Clause 7.1. The power level of the interferer (P _{Interferer} ) for Range 3 shall be modified to -20 dBm for						
	$F_{\text{Interferer}} > 2700 \text{ MHz}$ and $F_{\text{Interferer}} < 4800 \text{ MHz}$ .						
NOTE 6:							
	For UE supporting both bands 25 and 70, the F _{DL_high} of band 70 is applied as F _{DL_high} for band 25, and						
	the $F_{DL low}$ of band 25 is applied as $F_{DL low}$ for band 70.						
			er (PInterferer) for Range 3	shall be modified to -20	dBm for FInterferer >		
	$2580 \text{ MHz} and F_{\text{Interfe}}$						

## Table 7.6.3.3-2: Out of-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

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For interferer frequencies across ranges 1, 2 and 3 in Table 7.6.3.3-2, a maximum of

$$|\max\{24, 6 \cdot [n \cdot N_{RB} / 6]\}/\min\{|n \cdot N_{RB} / 10|, 5\}|$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of min( $\lfloor BW_{channel}/2 \rfloor$ ,5) MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration, BW_{Channel} is the bandwidth of the frequency channel in MHz and n = 1,2,3 for SCS = 15,30,60 kHz, respectively. For these exceptions, the requirements in subclause 7.7 apply.

For NR bands with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range up to  $3*BW_{Channel}$  below or from  $3*BW_{Channel}$  above the UE receive band, where  $BW_{Channel}$  is the channel bandwidth. The throughput of the wanted signal shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3.3-3 and Table 7.6.3.3-4. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

Table 7.6.3.3-3: Out-of-band blocking parameters for NR bands with F _{DL_low} ≥ 3300 MHz and F _{UL_low} ≥
3300 MHz

RX parameter	Units	Channel bandwidth (MHz)				
		10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100		
Power in transmission bandwidth configuration	transmission bandwidth dBm		REFSENS + 6 dBREFSENS + 7 dBREFSENS + 7 dB			
NOTE: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.						

NR band	Parameter	Unit	Range1	Range 2	Range 3		
n77, n78	Pinterferer	dBm	-44	-30	-15		
(NOTE 3)	Finterferer (CW)	MHz	-60 < f – F _{DL_low} ≤ -3*BW _{Channel} or 3*BW _{Channel} ≤ f – F _{DL_high} < 60	$-200 < f - F_{DL_{low}} \le$ $-$ MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) $\le f - F_{DL_{high}} < 200$	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel}) \\ 0 \\ & \\ & \\ & \\ F_{DL_high} \\ + \\ MAX(200,3^*BW_{Channel}) \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ $		
n79 (NOTE 4)	Finterferer (CW)	MHz	N/A	-150 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 150	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(150,3^*BW_{Channel}) \\ or \\ F_{DL_high} \\ + \\ MAX(150,3^*BW_{Channel}) \\ ) \\ \leq f \leq 12750 \end{array}$		
60	000 MHz.			shall be modified to -20	dBm for F _{Interferer} >		
<ul> <li>6000 MHz.</li> <li>NOTE 2: BW_{Channel} denotes the channel bandwidth of the wanted signal</li> <li>NOTE 3: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm, for F_{Interferer} &gt; 2700 MHz and F_{Interferer} &lt; 4800 MHz. For BW_{Channel} &gt; 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3*BW_{Channel} from the band edge. For BW_{Channel} larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the band edge.</li> <li>NOTE 4: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm, for F_{Interferer} &gt; 3650 MHz and F_{Interferer} &lt; 5750 MHz. For BW_{Channel} ≥ 40 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3*BW_{Channel} &gt; 15 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the band edge.</li> </ul>							

## Table 7.6.3.3-4: Out of-band blocking for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz

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For interferer frequencies across ranges 1, 2 and 3 in Table 7.6.3.3-4, a maximum of

 $\left|\max\{24,6\cdot\left[n\cdot N_{RB}/6\right]\}/\min\{\left|n\cdot N_{RB}/10\right|,5\}\right|\right|$ 

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of min( $\lfloor BW_{channel}/2 \rfloor$ ,5) MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration, BW_{Channel} the bandwidth of the frequency channel in MHz and n = 1,2,3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in subclause 7.7 apply.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6.3.

## 7.6.3.4 Test Description

## 7.6.3.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, and are shown in table 7.6.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.3.

Default Conditions							
	onment as specified in T	S	Normal				
38.508-1 [	5] subclause 4.1						
Test Frequ	uencies as specified in TS	S	One frequence	cy chosen arbitrarily from	low or high range		
38.508-1 [	5] subclause 4.3.1						
Test Chan	nel Bandwidths as specif	fied in	Lowest, Mid,	Highest			
TS 38.508	-1 [5] subclause 4.3.1		Lowest UL / L	Lowest DL, Lowest UL / H	lighest DL		
			(NOTE 3)		•		
Test SCS	as specified in TS 38.508	3-1 [5]	Lowest				
subclause							
		Т	est Parameter	S			
	Downlink Co	nfigura	tion	Uplink Config	guration		
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation		
1	CP-OFDM QPSK	1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1		
NOTE 1:	The specific configuratio	n of upl	ink and downlir	nk are defined in Table 7.	3.2.4.1-1.		
NOTE 2:	In a band where UE sup	ports 4	Rx, the test sha	Il be performed only with	4Rx antennas		
	ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test						
	requirements.						
NOTE 3:	Additional test points sel	ected a	ccording to asy	mmetric channel bandwi	dths specified in		
	clause 5.3.6. DL channe	l bandw	vidth shall be se	elected first.			

## Table 7.6.3.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508 [5] Annex A, in Figure A.3.1.4.2 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and DL Reference Measurement channels are set according to Table 7.6.3.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6.3.4.3.

## 7.6.3.4.2 Test Procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.3.5-2 or 7.6.3.5-4. The frequency step size is min( $|BW_{channel}/2|$ ,5) MHz.
- 4. Set the downlink signal level according to the table 7.6.3.5-1 or 7.6.3.5-3. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6.3.5-1 or Table 7.6.3.5-3 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS

38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.

- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
- 6. Record the frequencies for which the throughput doesn't meet the requirements.
- 7. Repeat steps from 3 to 6, using an interfering signal above the wanted signal at step 3.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

7.6.3.5 Test Requirement

For NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 with parameters specified in Tables 7.6.3.5-1 and 7.6.3.5-2.

For NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed  $\lfloor \max\{24,6 \cdot \lceil n \cdot N_{RB} / 6\rceil\}/\min\{\lfloor n \cdot N_{RB} / 10\rfloor,5\}\rfloor$  in each assigned frequency channel when measured using a min( $\lfloor BW_{channel} / 2\rfloor,5$ ) MHz step size. For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

# Table 7.6.3.5-1: Out-of-band blocking parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

RX parameter	Units	Channel bandwidth (MHz)							
		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100					
Power in transmission bandwidth configuration ²	dBm	REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB					
NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.									
NOTE 2: 10log10	o(x) is round	ded to the next hi	igher 0.5dB valu	е.					

Parameter	Unit	Range 1	Range 2	Range 3		
Pinterferer	dBm	-44	-30	-15		
Finterferer (CW)	MHz					
		$-60 < f - E_{\rm D}$ , $h_{\rm H} < -15$	-85 < f - Epi 1 < -60	$1 \le f \le F_{DL_{low}} - 85$		
			= -	or		
		•.	÷.	F _{DL_high} + 85 ≤ f		
				≤ 12750		
			<u> </u>			
	ne interfere	er (PInterferer) for Range 3	shall be modified to -20 (	dBm for FInterferer >		
	~					
			h for band 51. For band 5	ou, the FDL_low of band		
			fan han di ZO. Ean han di			
			h for band 76. For band 7	5, the FDL_low of band		
			and <b>C</b> of band 41 is	applied on <b>F</b> and		
	Join band	S 36 and 41, the FDL_high	and FDL_low of Dand 41 is	applied as FDL_high and		
	romont in	this frequency rende	ording to the general re-	quirement defined in		
			shall be modified to $-20$	dBm for Futurious >		
	Pinterferer         Finterferer         Finterferer         CW         The power level of th         5000 MHz.         For band 51 the Foll         51 is applied as Foll         For band 76 the Foll         76 is applied as Foll         For UEs supporting b         For UEs supporting b         Thereferer > 2700 MHz         Void.         For UE supporting b         the Follow of band 22         The power level of th	Pinterferer         dBm           Finterferer         MHz           Finterferer         MHz           The power level of the interferer         MHz           The power level of the interferer         MHz           5000 MHz.         MHz           For band 51 the FDL_high of ban         So ban           51 is applied as FDL_low for ban         For band 76 the FDL_high of ban           For band 76 the FDL_high of ban         So ban           For UEs supporting both band         For UEs supporting both band           For UEs supporting both band         So band 38.           n48 follows the requirement in         Clause 7.1. The power level of           Finterferer > 2700 MHz and Finterf         Yoid.           For UE supporting both bands         So band 25 is applie           The power level of the interferer         So band 25 is applie	PinterfererdBm-44FinterfererGWMHzFinterferer $CW$ MHz-60 < f - FDL_low < -15 or 15 < f - FDL_high < 60	PinterfererdBm-44-30Finterferer (CW)MHz $-60 < f - F_{DL_low} < -15$ or $-85 < f - F_{DL_low} \leq -60$ or $15 < f - F_{DL_high} < 60$ $0 \leq f - F_{DL_high} < 85$ The power level of the interferer (Pinterferer) for Range 3 shall be modified to -20 of 6000 MHz. $60 \leq f - F_{DL_high} < 85$ For band 51 the F_{DL_high} of band 50 is applied as $F_{DL_high}$ for band 51. For band 51.For band 51 the F_{DL_olow} for band 50.For band 76 the F_{DL_olow} for band 75.For UEs supporting both bands 38 and 41, the $F_{DL_high}$ and $F_{DL_olow}$ of band 41 is $F_{DL_ow}$ for band 38. $n48$ follows the requirement in this frequency range according to the general red Clause 7.1. The power level of the interferer (Pinterferer) for Range 3 shall be modified to -2000 WHz.For UE supporting both bands 25 and 70, the $F_{DL_high}$ of band 70 is applied as $F_{DL_low}$ for band 58.For UE supporting both bands 25 and 70, the $F_{DL_high}$ of band 70 is applied as $F_{DL_low}$ for band 50.For UE supporting both bands 25 and 70, the $F_{DL_high}$ and $F_{DL_low}$ for band 51.For UE supporting both bands 25 and 70, the $F_{DL_high}$ and $F_{DL}$ is applied as $F_{DL_low}$ of band 70.The power level of the interferer (Pinterferer) for Range 3 shall be modified to -20 of the $F_{DL_low}$ of band 25 is applied as $F_{DL_low}$ for band 70.		

## Table 7.6.3.5-2: Out of-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

For NR bands with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, the throughput measurement derived in test procedure shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 with parameters specified in Tables 7.6.3.5-3 and 7.6.3.5-4.

For NR bands with  $F_{DL_low} \ge 3300 \text{ MHz}$  and  $F_{UL_low} \ge 3300 \text{ MHz}$ , the number of spurious response frequencies recorded in the final step of test procedure shall not exceed  $\lfloor \max\{24,6 \cdot \lceil n \cdot N_{RB} / 6\rceil\}/\min\{\lfloor n \cdot N_{RB} / 10 \rfloor, 5\} \rfloor$  in each assigned frequency channel when measured using a min( $\lfloor BW_{channel} / 2 \rfloor, 5$ ) MHz step size. For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

## Table 7.6.3.5-3: Out-of-band blocking parameters for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz

RX parameter	Units	Channel bandwidth (MHz)						
		10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100				
Power in transmission bandwidth configuration		REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + 9 dB				
NOTE: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.								

NR band	Parameter	Unit	Range1	Range 2	Range 3		
n77, n78	Pinterferer	dBm	-44	-30	-15		
(NOTE 3)	Finterferer (CW)	MHz	-60 < f – F _{DL_low} ≤ -3*BW _{Channel} or 3*BW _{Channel} ≤ f – F _{DL_high} < 60	-200 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 200	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} \\ + \\ MAX(200,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$		
n79 (NOTE 4)	Finterferer (CW)	MHz	N/A	-150 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 150	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(150,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} \\ + \\ MAX(150,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$		
		ne interfere	er (PInterferer) for Range 3	shall be modified to -20	dBm for FInterferer >		
<ul> <li>NOTE 1: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm for F_{Interferer} &gt; 6000 MHz.</li> <li>NOTE 2: BW_{Channel} denotes the channel bandwidth of the wanted signal</li> <li>NOTE 3: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm, for F_{Interferer} &gt; 2700 MHz and F_{Interferer} &lt; 4800 MHz. For BW_{Channel} &gt; 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3*BW_{Channel} from the band edge. For BW_{Channel} larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3*BW_{Channel} from the band edge.</li> </ul>							
3	650 MHz and FInterf	_{erer} < 5750	MHz. For BW _{Channel} ≥ 40	shall be modified to -20 MHz, the requirement f set of 3*BW _{Channel} from th	or Range 2 is not		

## Table 7.6.3.5-4: Out of-band blocking for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz

Table 7.6.3.5-5: Void

## 7.6.4 Narrow band blocking

## 7.6.4.1Test Purpose

Verifies a receiver's ability to receive a NR signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other NR Node B transmitters exist (except in the adjacent channels and spurious response).

## 7.6.4.2 Test Applicability

This test applies to all types of NR UE release 15 and forward.

## 7.6.4.3 Minimum Conformance Requirements

The relative throughput shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.4.3-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

NR band	Parameter	Unit					Channel Bandwidth (MHz)
			5	10	15	20	25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100
	Pw	dBm				Prefse	NS + channel-bandwidth specific value below
			16	13	14	16	16
n1, n2, n3, n5,	Puw (CW)	dBm					-55
n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n30, n34, n38, n39, n40, n41, n48, n50, n51, n53,	Fuw (offset SCS= 15 kHz) ⁴	MHz	$\left(\left\lfloor\frac{\frac{BW_{channel}}{2} + 0.2}{SCS} + 0.5\right\rfloor + 0.5\right)SCS$				NA
n65, n66, n67, n70, n71, n74, n75, n76	F _{uw} (offset SCS= 30 kHz) ⁴	MHz		NA			$\left(\left\lfloor\frac{\frac{BW_{Channel}}{2} + BW_{GB,Channel}}{SCS} + 0.5\right\rfloor + 0.5\right)SCS$
NOTE 1:       The transmitter shall be set a 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4         NOTE 2:       Reference measurement channel is specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.         NOTE 3:       The P _{REFSENS} power level is specified in Table 7.3.2-1 and Table 7.3.2-2 for two and four antenna ports, respectively.         NOTE 4:       Fuw shall be rounded to half of SCS.							

## Table 7.6.4.3-1: Narrow Band Blocking

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6.4.

7.6.4.4 Test Description

## 7.6.4.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, and are shown in table 7.6.4.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions						
Test Environment as specified in TS			Normal			
	5] subclause 4.1					
Test Frequ	uencies as specified in TS	S	Mid range (N	OTE 4)		
	5] subclause 4.3.1					
	nel Bandwidths as specif	fied in	Lowest, Mid a	0		
TS 38.508	-1 [5] subclause 4.3.1			Lowest DL, Lowest UL / H	lighest DL	
			(NOTE 2)			
	as specified in TS 38.508	3-1 [5]	According to	CH BW SCS in table 7.6.	4.3-1	
subclause	4.3.1					
		T	est Parameter	S		
	Downlink Co	nfigura	ation Uplink Configuration			
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation	
1	CP-OFDM QPSK	1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1	
NOTE 1:	The specific configuratio	n of upl	ink and downlii	nk are defined in Table 7.	3.2.4.1-1.	
NOTE 2:	Additional test points sel	ected a	ccording to asy	mmetric channel bandwi	dths specified in	
	clause 5.3.6. DL channel bandwidth shall be selected first.					
NOTE 3:	NOTE 3: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas					
	ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test					
	requirements.					
NOTE 4:	For NR band n28, 30MH	lz test c	hannel bandwi	dth is tested with Low rar	ige test	
	frequencies.				-	

## Table 7.6.4.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.2 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and DL Reference Measurement channels are set according to Table 7.6.4.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6.4.4.3.

## 7.6.4.4.2 Test Procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6.4.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6.4.4.1-1. Since the UE has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.4.5-1.
- 4. Set the downlink signal level according to the table 7.6.4.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6.4.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.

- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
- 6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## 7.6.4.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

## 7.6.4.5 Test Requirement

The throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 with parameters specified in Table 7.6.4.5-1.

NR band	Parameter	Unit		Channel Bandwidth (MHz)				
			5	10	15	20	25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	
	Pw	dBm				NS + channel-bandwidth specific value below		
			16	13	14	16	16	
n1, n2, n3, n5,	P _{uw} (CW)	dBm					-55	
n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n30, n34, n38, n39, n40, n41, n48, n50, n51, n53,	F _{uw} (offset SCS= 15 kHz) ⁴	MHz	$\left(\left \frac{BV}{M}\right \right)$	V _{Channel} 2 SCS	+ 0.2 + 0 + 0.		NA	
n65, n66, n67, n70, n71, n74, n75, n76	F _{uw} (offset SCS= 30 kHz)⁴	MHz		Ν	IA		$\left(\left \frac{\frac{BW_{Channel}}{2} + BW_{GB,Channel}}{SCS} + 0.5\right  + 0.5\right)SCS$	
<ul> <li>NOTE 1: The transmitter shall be set a 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4</li> <li>NOTE 2: Reference measurement channel is specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.</li> </ul>								

Table 7.6.4.5-1: Narrow-band blocking

NOTE 3: The PREFSENS power level is specified in Table 7.3.2-1 and Table 7.3.2-2 for two and four antenna ports, respectively.

NOTE 4: Fuw shall be rounded to half of SCS.

## Table 7.6.4.5-2 Void

## 7.6A Blocking characteristics for CA

- 7.6A.1 General
- 7.6A.2 Inband blocking for CA
- 7.6A.2.0 Minimum requirements

## 7.6A.2.0.1 In-band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. The UE shall fulfil the minimum requirement specified in Table 7.6A.2.0.1-1a for an adjacent channel interferer on either side of the aggregated downlink signal at a specified frequency offset and for an interferer power up to -25 dBm. The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## Table 7.6A.2.0.1-1: In-band blocking parameters for intra-band contiguous CA with $F_{DL_{low}} \ge 3300 \text{ MHz}$ and $F_{UL_{low}} \ge 3300 \text{ MHz}$

Rx Parameter	Unit	Init NR CA bandwidth class							
	S	В	С	D					
Pw in Transmission		REFSENS + CA ba	REFSENS + CA bandwidth class specific value below						
Bandwidth Configuration, per CC	dB	10.0	6	13.8					
BWInterferer	MHz	20	BW _{channel} CA	50					
Floffset, case 1	MHz	30	BW _{channel CA} +	75					
			BW _{channel CA} /2						
Floffset, case 2	MHz	50	BWInterferer + Floffset, case	125					
			1						
NOTE 1: The transr	nitter sha	all be set to 4dB below P _{CMAX_L,f,c} a	at the minimum UL config	uration specified in					
		P _{CMAX_L,f,c} defined in clause 6.2.4.							
NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and									
A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1									
and set-up	accordi	ing to Annex C.3.1							

## Table 7.6A.2.0.1-1a: In-band blocking parameters for intra-band contiguous CA with $F_{DL_low}$ < 2700 MHz and $F_{UL_low}$ < 2700 MHz

Rx Parameter	Units	NR CA bandwidth class					
		В	С				
Pw in Transmission Bandwidth Configuration,	dBm	REFSENS + NR CA bandwidth class specific value below	REFSENS + NR CA bandwidth class specific value below				
per CC		16.0	19.0				
BWInterferer	MHz	5	5				
Floffset, case 1	MHz	7.5	7.5				
Floffset, case 2	MHz	12.5	12.5				
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1</li> </ul>							

## Table 7.6A.2.0.1-2: In-band blocking for intra-band contiguous CA with $F_{DL_{low}} \ge 3300 \text{ MHz}$ and $F_{UL_{low}} \ge 3300 \text{ MHz}$

NR band	Parameter	Unit	Case 1	Case 2					
	Pinterferer	dBm	-56	-44					
n77, n78,	Finterferer (offset)	MHz	-BW _{channel CA} /2 -F _{loffset, case 1}	≤ -BW _{channel CA} /2 -F _{loffset, case 2}					
n79			and	and					
			BWchannel CA/2 +Floffset, case 1	$\geq$ BW _{channel CA} /2 +F _{loffset} , case 2					
	Finterferer	MHz		$F_{DL_{low}} - 3BW_{channel CA}$					
			NOTE 2	to					
				FDL_high + 3BWchannel CA					
NOTE 1:	The absolute value	of the interfer	er offset Finterferer (offset) shall be	further adjusted to					
	$\left( \left  F_{\text{interferer}} \right  / SCS \right  +$	0.5) <i>SCS</i> MHz	z with SCS the sub-carrier spacing of	f the carrier closest to the interferer in					
	MHz. The interferer	is an NR sigr	nal with an SCS equal to that of the c	closest carrier.					
NOTE 2:	For each carrier free	quency, the re	equirement applies for two interferer	carrier frequencies: a: -BW _{channel CA} /2 –					
	Floffset, case 1; b: BWchannel CA/2 + Floffset, case 1								
NOTE 3:	BW _{channel CA} denotes	s the aggrega	ted channel bandwidth of the wanted	l signal					

NR	Parameter	Unit	Case 1	Case 2	Case 3
band	Pinterferer	dBm	-56	-44	
n66	Finterferer	MHz	-BWchannel CA/2 -Floffset, case 1	≤ -BW _{channel CA} /2 -Floffset, case 2	
n41	(offset)		and	and	
n484			BWchannel CA/2 +Floffset, case 1	≥ BW _{channel CA} /2 +F _{loffset, case 2}	
n40	Finterferer	MHz		F _{DL_low} – 15	
			NOTE 2	to	
				F _{DL_high} + 15	
n71	Finterferer	MHz		F _{DL_low} – 12	$F_{DL_{low}} - 12$
			NOTE 2	to	
				F _{DL_high} + 15	
NOTE '				(offset) shall be further adjusted	
	$\left( \left  F_{\text{interferer}} \right  \right)$	$SCS \mid + 0$	(0.5)SCS MHz with SCS the sub-	ub-carrier spacing of the carrier of	closest to the interferer in
	MHz. The ir	terferer	is an NR signal with 15 kHz S	CS.	
NOTE 2	2: For each ca	rrier freq	uency, the requirement applie	es for two interferer carrier freque	encies: a: -BW _{channel CA} /2
	- Floffset, case	1; b: BW	channel CA/2 + Floffset, case 1		
NOTE 3	3: BWchannel CA	denotes	the aggregated channel band	width of the wanted signal.	
NOTE 4	4: n48 follows	the requ	irement in this frequency rang	e according to the general requi	rement defined in Clause
	7.1A.				

## Table 7.6A.2.0.1-2a: In-band blocking for intra-band contiguous CA with $F_{DL_low}$ < 2700 MHz and $F_{UL_low}$ < 2700 MHz

## 7.6A.2.0.2 In-band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the in-band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.0.3.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclause 7.6.2 and in this subclause for one component carrier and two component carriers per sub-block, respectively. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.6A.2.0.3 In-band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the in-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.6.2 for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.6.2.3-2 and 7.6.2.3-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

For E-UTRA CA configurations including an operating band without uplink operation or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The requirements for the component carrier configured in the operating band without uplink operation are specified in Table 7.6A.2.3-1.

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
			Floffset, case 1	Floffset, case 2			
			and	and			
			CBW/2 +	≥ CBW/2 +			
			Floffset, case 1	Floffset, case 2			
n29	Finterferer	MHz	NOTE 2	FDL_low – 15			
				to			
				F _{DL_high} + 15			
			ed modulated interfer				
			, but within the first 1	5 MHz below or			
	above the UE receiv						
			e requirement applies				
			- Floffset, case 1; b: CB				
NOTE 3: 1	The absolute value g	of the inter	ferer offset Finterfere	er (offset) shall be			
f	further adjusted to $\left( \left  F_{\text{interferer}} \right  / SCS \right  + 0.5 \right) SCS$ MHz with SCS the						
s	sub-carrier spacing of the wanted signal in MHz. The interferer is an						
	NR signal with an SCS equal to that of the wanted signal						
			dwidth of the wanted				

## Table 7.6A.2.3-1: In-band blocking parameters for additional NR operating bands for carrier aggregation with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6A.2.

## 7.6A.2.1 In-band blocking for CA (2DL CA)

## 7.6A.2.1.1 Test purpose

Inband blocking is defined for an unwanted interfering signal falling into the range from 15 MHz below to 15 MHz above the UE receive band, with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, or into an immediately adjacent frequency range up 3CBW below or above the UE receive band, with  $F_{DL_high} \ge 3300$  MHz and  $F_{UL_high} \ge 3300$  MHz, at which the relative throughput shall meet or exceed the requirement for the specified measurement channel.

## 7.6A.2.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward that support 2DL CA.

## 7.6A.2.1.3 Minimum conformance requirements

Minimum requirements are defined in clause 7.6A.2.0.

- 7.6A.2.1.4 Test description
- 7.6A.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configuration specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in table 7.6A.2.1.4.1-1, 7.6A.2.1.4.1-2 or 7.6A.2.1.4.1-3. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2..

	Default Conditions					
Test Environment as specified in TS 38.508- 1 [5] subclause 4.1			Normal			
Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1			Mid range			
Test CC Combination setting (N _{RB_agg} ) as specified in Table 5.5A.1-1 for the CA Configuration across bandwidth combination sets supported by the UE.		Highest N _{RB_agg} , NOTE 1, NOTE 3				
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest			
			Test Paramete	rs		
	Downlir	nk Configuration	Uplink Configuration			
Test	CC	PCC RB	SCC RB	CC	PCC RB	
ID	Mod'n	allocation	allocation	Mod'n	allocation	
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1	
<ul> <li>NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3A.1.4.1-1.</li> <li>NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.</li> <li>NOTE 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg}, only the combination with the highest NRB_PCC is tested</li> </ul>						

## Table 7.6A.2.1.4.1-1: Test configuration table for Intra-band contiguous CA

## Table 7.6A.2.1.4.1-2: Test configuration table for Inter-band CA

Default Conditions							
Test E	Environment as specified	d in TS 38.508-	Normal				
1 [5] s	ubclause 4.1						
Test F	requencies as specified	l in TS 38.508-1	NOTE 1, NOT	E 3			
[5] sub	oclause 4.3.1						
	CC Combination setting		Highest N _{RB_ag}	19			
specifi	ied in Table 5.5A.3.1-1	for the CA	NOTE 1, NOT	E 4			
	guration across bandwid	th combination					
	sets supported by the UE.						
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest				
			Test Parameter	rs			
	Downlin	nk Configuration	Uplink Configuration				
Test	CC	PCC RB	SCC RB	CC	PCC RB		
ID	Mod'n	allocation	allocation	Mod'n	allocation		
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1		
NOTE	1: The specific config	uration of uplink a	and downlink are	e defined in Table 7.3A.1.4.1	<ol> <li>Only test points</li> </ol>		
				re used for in-band blocking			
NOTE				performed only with 4Rx ant			
	connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.						
				tested with Low range test f			
NOTE				CA Configuration with the sa	ame NRB_agg, only		
	the combination wi	th the highest NR	B_PCC is tested	d.			

	Default Conditions							
	invironment as specified ubclause 4.1		Normal					
Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1			NOTE 1					
specifi Config	CC Combination setting ied in Table 5.5A.2-1 for guration across bandwid upported by the UE.	the CA	Highest N _{RB_ag} NOTE 1, NOT					
Test S	CS as specified in Tabl		Lowest					
Test Parameters								
	Downlin	k Configuration	Uplink Configuration					
Test	CC	PCC RB	SCC RB	CC	PCC RB			
ID	Mod'n	allocation	allocation	Mod'n	allocation			
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1			
<ul> <li>NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3A.1.4.1-3. Only test points verifying non-exceptional REFSENS requirements are used for in-band blocking.</li> <li>NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.</li> <li>NOTE 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg}, only the combination with the highest NRB_PCC is tested.</li> </ul>								

## Table 7.6A.2.1.4.1-3: Test configuration table for Intraband non-contiguous CA

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.6A.2.1.4.1-1, 7.6A.2.1.4.1-2 or 7.6A.2.1.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.6A.2.1.4.3.

## 7.6A.2.1.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.2.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Tables 7.6A.2.1.4.1-1, 7.6A.2.1.4.1-2 or 7.6A.2.1.4.1-3 on both SCC and PCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Tables 7.6A.2.1.4.1-1, 7.6A.2.1.4.1-2 or 7.6A.2.1.4.1-3 on PCC. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. For Intra-band contiguous CA: Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Tables 7.6A.2.1.5.1-1 and 7.6A.2.1.5.1-2 or Tables 7.6A.2.1.5.1-1a and 7.6A.2.1.5.1-2a as appropriate depending on NR band.

For Inter-band CA: Set the parameters of the signal generator for an interfering signal below the SCC's wanted signal in Case 1 according to Tables 7.6A.2.1.5.3-1 and 7.6A.2.1.5.3-2 or Tables 7.6A.2.1.5.3-1a and 7.6A.2.1.5.3-2a as appropriate depending on NR band.

For Intra-band non-contiguous CA: Set the parameters of the signal generator for an interfering signal below the PCC's wanted signal in Case 1 according to 7.6A.2.1.5.3-1 and 7.6A.2.1.5.3-2 or Tables 7.6A.2.1.5.3-1a and 7.6A.2.1.5.3-2a as appropriate depending on NR bands as appropriate, excluding frequencies where the interferer centre frequency falls within SCC carrier  $\pm(BW/2 + F_{Ioffset,case 1})$ , where BW & offset refer to SCC.

- Set the downlink signal level on both carriers according to the table 7.6A.2.1.5.1-1, 7.6A.2.1.5.1-1a or 7.6A.2.1.5.3-1, 7.6A.2.1.5.3-1a as appropriate. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in table 7.6A.2.1.5.1-1, 7.6A.2.1.5.1-1a or 7.6A.2.1.5.3-1, 7.6A.2.1.5.3-1a for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. For Intra-band contiguous CA: Measure the average throughput of both carriers for a duration sufficient to achieve statistical significance according to Annex H.2A.

For Inter-band CA: Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A.

- For Intra-band non-contiguous CA: Measure the average throughput of PCC for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal in Case 1 at step 6.
- 10. For Intra-band non-contiguous only: Repeat steps from 6 to 9, using an interfering signal below and above the SCC in Case 1 and measuring SCC instead of PCC in step 8, excluding the frequencies where the interferer centre frequency falls within PCC carrier  $\pm (BW/2 + F_{Ioffset,case 1})$ , where BW & offset refer to PCC.
- 11. Repeat steps from 6 to 10, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth.
- 12. Repeat steps from 6 to 10, using interfering signals in Case 3 as applicable at step 6 and 9. The ranges of case 3 are covered in steps equal to the interferer bandwidth.
- 13. For Inter-band CA only: Repeat steps from 1 to 12 setting the original PCell as SCell and the original SCell as PCell in the corresponding CA configuration, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## 7.6A.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

7.6A.2.1.5 Test requirement

7.6A.2.1.5.1 Intra-band contiguous 2DL CA

The throughput of each carrier shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the

DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters defined in 7.6A.2.1.5.1-1a and 7.6A.2.1.5.1-2a. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

## Table 7.6A.2.1.5.1-1: In-band blocking parameters for intra-band contiguous CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

Rx Parameter	Unit	NR C	CA bandwidth class				
	S	В	С				
Pw in Transmission		REFSENS + CA bandwidth class specific value below					
Bandwidth	dBm						
Configuration, per	ubiii	10.0	6				
CC							
BWInterferer	MHz	20	BW _{channel} CA				
Floffset, case 1	MHz	30	BW _{channel CA} +				
			BW _{channel CA} /2				
Floffset, case 2	MHz	50	BWInterferer + Floffset, case				
			1				
NOTE 1: The transr	nitter sha	all be set to 4dB below PCMAX_L,f,c a	at the minimum UL config	uration specified in			
		PCMAX_L,f,c defined in clause 6.2.4.					
NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and							
	A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1						
and set-up	accordi	ng to Annex C.3.1					

# Table 7.6A.2.1.5.1-1a: In-band blocking parameters for intra-band contiguous CA with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz

Rx Parameter	Units	NR CA bandwidth class			
		В	С		
Pw in Transmission Bandwidth Configuration,	dBm	REFSENS + NR CA bandwidth class specific value below	REFSENS + NR CA bandwidth class specific value below		
per CC		16.0	19.0		
BWInterferer	MHz	5	5		
Floffset, case 1	MHz	7.5	7.5		
Floffset, case 2 MH2		12.5	12.5		
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1</li> </ul>					

# Table 7.6A.2.1.5.1-2: In-band blocking for intra-band contiguous CA with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

Parameter	Unit	Case 1	Case 2			
Pinterferer	dBm	-56	-44			
Finterferer (offset)	MHz	-BWchannel CA/2 -Floffset, case 1	≤ -BW _{channel} CA/2 -F _{loffset} , case 2			
		and	and			
		BWchannel CA/2 +Floffset, case 1	≥ BW _{channel CA} /2 +F _{loffset, case 2}			
Finterferer	MHz		FDL_low — 3BWchannel CA			
		NOTE 2	to			
			FDL_high + 3BWchannel CA			
$ F_{\text{interferer}} /SCS  +$	0.5) <i>SCS</i> MH:	z with SCS the sub-carrier spacing o	f the carrier closest to the interferer in			
NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -BWchannel CA/2 -						
Floffset, case 1, b: BWchannel CA/2 + Floffset, case 1						
Wchannel CA denotes	the aggregation	ted channel bandwidth of the wanted	d signal			
	Pinterferer         Finterferer         Finterferer         (IF)         He absolute value $ F_{interferer} /SCS $ +         MHz. The interferer         For each carrier free         Infiset, case 1; b: BWch	Pinterferer     dBm       Finterferer     0ffset)       MHz       Finterferer     MHz       The absolute value of the interferer $ F_{interferer} /SCS  + 0.5$ MHz. The interferer is an NR sign       For each carrier frequency, the reference of the interferer       Infiset, case 1; b: BWchannel CA/2 + Floo	Pinterferer       dBm       -56         Finterferer (offset)       MHz       -BWchannel CA/2 -Floffset, case 1 and BWchannel CA/2 +Floffset, case 1         Finterferer       MHz       NOTE 2         The absolute value of the interferer offset Finterferer (offset) shall be $[F_{interferer} /SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of MHz. The interferer is an NR signal with an SCS equal to that of the correct of the requirement applies for two interferer			

NR	Parameter	Unit	Case 1	Case 2	Case 3
band	Pinterferer	dBm	-56	-44	
n66	Finterferer	MHz	-BWchannel CA/2 -Floffset, case 1	≤ -BW _{channel CA} /2 -Floffset, case 2	
n41	(offset)		and	and	
n484			BWchannel CA/2 +Floffset, case 1	≥ BW _{channel CA} /2 +F _{loffset, case 2}	
	Finterferer	MHz		$F_{DL_{low}} - 15$	
			NOTE 2	to	
				F _{DL_high} + 15	
n71	Finterferer	MHz		$F_{DL_{low}} - 12$	$F_{DL_{low}} - 12$
			NOTE 2	to	
				F _{DL_high} + 15	
NOTE 1				(offset) shall be further adjusted t	
	$\left( \left  F_{\text{interferer}} \right  \right)$	SCS   + 0	(0.5)SCS MHz with SCS the su	b-carrier spacing of the carrier cl	osest to the interferer in
	MHz. The ir	terferer i	is an NR signal with 15 kHz S	CS.	
NOTE 2	2: For each ca	rrier freq	uency, the requirement applie	s for two interferer carrier freque	ncies: a: -BW _{channel CA} /2
	- Floffset, case	1; b: BW	channel CA/2 + Floffset, case 1		
NOTE 3	3: BWchannel CA	denotes	the aggregated channel band	width of the wanted signal	
NOTE 4	4: n48 follows 7.1A	the requ	irement in this frequency rang	e according to the general require	ement defined in Clause

## Table 7.6A.2.1.5.1-2a: In-band blocking for intra-band contiguous CA with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz

## 7.6A.2.1.5.2 In-band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the in-band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclause 7.6.2. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\ge 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters defined in 7.6A.2.1.5.3-1 and 7.6A.2.1.5.3-2.

The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

## 7.6A.2.1.5.3 In-band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the in-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements for each component carrier, when operated as SCell, while all downlink carriers are active.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters defined in 7.6A.2.1.5.3-1 and 7.6A.2.1.5.3-2. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

RX parameter	Units		CI	hannel bandwig	dth				
-		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz			
Power in	dBm	REFSENS + channel specific value below							
transmission	dB	6	6	7	9	10			
bandwidth									
configuration									
BWinterferer	MHz			5					
Floffset, case 1	MHz			7.5					
Floffset, case 2	MHz			12.5					
RX parameter	Units		CI	hannel bandwid	dth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz			
Power in	dBm		REFSENS +	channel specifi	c value below				
transmission	dB	11	12	13	14	15			
bandwidth									
configuration									
BWinterferer	MHz			5					
Floffset, case 1	MHz			7.5					
Floffset, case 2	MHz			12.5					
RX parameter	Units		CI	hannel bandwid	dth				
		90 MHz	100 MHz						
Power in	dBm								
transmission		REFSENS + c	hannel specific						
bandwidth		value	below						
configuration									
	dB	15.5	16						
BWinterferer	MHz		5						
Floffset, case 1	MHz	z 7.5							
Floffset, case 2 MHz 12.5									
NOTE 1: The tra	ansmitter sh	nall be set to 4dE	below PCMAX_L,f,	cat the minimun	n UL configuratio	n specified in			
Table 7.3.2.3-3 with PCMAX_L,f,c defined in clause 6.2.4.									
NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided									
			D/TDD for the DL	-signal as descr	ibed in Annex A.	5.1.1/A.5.2.1			
and 15	kHz SCS								

# Table 7.6A.2.1.5.3-1: In-band blocking parameters for NR bands with FDL_high < 2700 MHz and FUL_high < 2700 MHz

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## Table 7.6A.2.1.5.3-1a: In-band blocking parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

RX parameter Units Channel bandwidth									
-		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz			
Power in	dBm		REFSENS + channel specific value below						
transmission	dB			6					
bandwidth									
configuration									
BWinterferer	MHz	10	15	20	40	50			
Floffset, case 1	MHz	15	22.5	30	60	75			
Floffset, case 2	MHz	25	37.5	50	100	125			
RX parameter	Units		CI	hannel bandwid	lth				
		60 MHz	80 MHz	90 MHz	100 MHz				
Power in	dBm	REF	SENS + channe	l specific value b	below				
transmission	dB		6	6					
bandwidth									
configuration									
BWinterferer	MHz	60	80	90	100				
Floffset, case 1	MHz	90	120	135	150				
Floffset, case 2 MHz 150 200 225 250									
NOTE 1: The transmitter shall be set to 4dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in									
Table 7.3.2.3-3 with PCMAX_L,f,c defined in clause 6.2.4.									
					d A.3.3.2 with or				
dynam	nic OCNG P	attern OP.1 FDD	D/TDD for the DL	-signal as descr	ibed in Annex A.	5.1.1/A.5.2.1.			

NR band	Parameter	Unit	Case 1	Case 2	Case 3		
	Pinterferer	dBm	-56	-44	-15		
n1, n2, n3,	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
n5, n7, n8,			Floffset, case 1	Floffset, case 2			
n12, n20,			and	and			
n28, n38,			CBW/2 +	≥ CBW/2 +			
n39, n40,			Floffset, case 1	Floffset, case 2			
n41, n48 ³ ,	Finterferer	MHz		F _{DL_low} – 15			
n50, n51,				to			
n66, n70,			NOTE 2	F _{DL_high} + 15			
n74, n75,							
n76							
n71	Finterferer	MHz	NOTE 2	F _{DL_low} – 12 to	F _{DL_low} – 12		
				F _{DL_high} + 15			
NOTE 1: T	he absolute value o	of the inter	ferer offset Finterfere	er (offset) shall be fui	rther adjusted to		
$\left(\left F_{\text{interferer}}\right  / SCS + 0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in							
MHz. The interferer is an NR signal with 15 kHz SCS.							
NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies:							
a: -CBW/2 – Floffset, case 1; b: CBW/2 + Floffset, case 1							
			this frequency range	e according to the ge	neral requirement		
d	efined in Clause 7.	1A.					

### Table 7.6A.2.1.5.3-2: In-band blocking for NR bands with $F_{DL_{high}}$ < 2700 MHz and $F_{UL_{high}}$ < 2700 MHz

Table 7.6A.2.1.5.3-2a: In-band blocking for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
n77, n78,	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
n79			Floffset, case 1	Floffset, case 2			
			and	and			
			BW/2 +	≥ CBW/2 +			
			Floffset, case 1	Floffset, case 2			
	Finterferer			F _{DL_low} – 3CBW			
			NOTE 2	to			
				FDL_high + 3CBW			
NOTE 1: T	he absolute value of	of the inter	ferer_offset Finterfere	er (offset) shall be			
		$ F_{\cdots} /$	<i>SCS</i> ]+0.5) <i>SCS</i> _{MH}				
S	ub-carrier spacing of	of the wan	ted signal in MHz. Th	ne interferer is an			
N	NR signal with an SCS equal to that of the wanted signal.						
NOTE 2: F	: For each carrier frequency, the requirement applies for two interferer						
	carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1						
			dwidth of the wanted				

Table 7.6A.2.1.5.3-2b: In-band blocking parameters for additional NR operating bands for carrier
aggregation with $F_{DL_{high}}$ < 2700 MHz and $F_{UL_{high}}$ < 2700 MHz

NR band	Parameter	Unit	Case 1	Case 2				
	Pinterferer	dBm	-56	-44				
	Finterferer (Offset)	MHz	-CBW/2 –	≤ -CBW/2 –				
			Floffset, case 1	Floffset, case 2				
			and	and				
			CBW/2 +	≥ CBW/2 +				
			Floffset, case 1	Floffset, case 2				
n29	Finterferer	MHz	NOTE 2	F _{DL_low} – 15				
				to				
				F _{DL_high} + 15				
NOTE 1: I	For certain bands, th	e unwante	ed modulated interfer	ring signal may not				
f	all inside the UE rec	eive band	l, but within the first 1	5 MHz below or				
	above the UE receiv							
			e requirement applies					
			- Floffset, case 1; b: CB					
NOTE 3:	The absolute value of	of the inter	ferer_offset Finterfere	er (offset) shall be				
f	further adjusted to $\left( \left  F_{\text{interferer}} \right  / SCS \right  + 0.5 \right) SCS$ MHz with SCS the							
	sub-carrier spacing of the wanted signal in MHz. The interferer is an							
			o that of the wanted					
NOTE 4: 0	CBW denotes the ch	annel ban	dwidth of the wanted	d signal				

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2-1,  $P_{interferer}$  power defined in Table 7.6A.2.1.5.3-2 and 7.6A.2.1.5.3-2a is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2-1.

### 7.6A.2.2 In-band Blocking for CA (3DL CA)

7.6A.2.2.1 Test purpose

Same test purpose as in clause 7.6A.2.1.

7.6A.2.2.2 Test applicability

This test applies to all types of NR UE release 15 and forward that support 3DL CA.

7.6A.2.2.3 Minimum conformance requirements

Minimum requirements are defined in clause 7.6A.2.0.

- 7.6A.2.2.4 Test description
- 7.6A.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configuration specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in table 7.6A.2.2.4.1-1, 7.6A.2.2.4.1-2 or 7.6A.2.2.4.1-3. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions									
		ent as specified in TS	Normal						
		bclause 4.1							
		es as specified in TS	Intra-band contiguous: Mid range for all CCs						
38.50	8-1 [5] sul	bclause 4.3.1		NOTE 1, NOTE					
					er-band: NOTE 1, NOTE 5				
					<ul> <li>Inter-band: NOTE 1 with</li> </ul>				
			intra-band n	on-contiguous d	lefined in table 7.3A.2.4.1	-1 (NOTE 5)			
		nation setting (N _{RB_agg} ) as	Highest N _{RB}	_agg, NOTE 1, N	OTE 6				
		oles 5.5A.1-1, 5.5A.2-1, or							
tables	in clause	es 5.5A.3.x for the CA							
Config	guration a	cross bandwidth							
combi	ination se	ts supported by the UE.							
Test S	SCS as sp	pecified in Table 5.3.5-1	Lowest for F	PCC and SCCs					
Netwo	ork signall	ing value	NS_01						
	0	5		n by Table 7.3.2	.3-4 for the band with acti	ve uplink			
			carrier	,		·			
			Test Para	meters					
		Downlink Config	guration		Uplink Configur				
Test	CC	PCC RB allocation	SCC1 RB	SCC ₂ RB	CC	PCC RB			
ID	Mod'n		allocation	allocation	Mod'n	allocation			
		efault Test Settings for a C							
1	CP-	NOTE 1	NC	DTE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
	QPSK								
		Default Test Settings for							
1	CP-	NOTE 1	NC	DTE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
	QPSK								
Det	fault Test	Settings for a CA_nXC-nYA,	CA_nYA-n>	<pre>(C, CA_nYA-nX)</pre>	B and CA_nXB-nYA Conf	igurations			
			band contigue	ous + Inter-band					
1	CP-	NOTE 1	NC	DTE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
	QPSK								
		Default Test Setti	ngs for a CA_	nX(2A)-nYA Co	nfigurations				
		(Intra-ba	nd non-contig	juous + Inter-bai					
1	CP-	NOTE 1	NC	DTE 1	DFT-s-OFDM QPSK	NOTE 1			
	OFDM								
	QPSK								
NOTE		specific configuration of uplir							
		ying non-exceptional REFSE							
NOTE		Configuration Test CC Comb	nation test se	ettings are check	ed separately for each C/	4			
	Conf	figuration.							
NOTE	3: Inter	-band: X,Y,Z correspond to							
n8A, X=1, Y=3, Z=8; Intra-band contiguous + Inter-band: X,Y correspond to the different									
bands in the CA Configuration, e.g. for CA_1C-3A, X=1,Y=3; Intra-band non-contiguous + Inter-									
band: X and Y correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n1A-									
n8A, X=1, Y =8									
NOTE 4: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports									
	conn	ected and 4Rx REFSENS re	quirement (T	able 7.3.2.5-2) is	s used in the test requiren	nents.			
NOTE		NR band n28, 30MHz test ch							
NOTE		UE supports multiple CC Co							
		bination with the highest NR				_ 33/ ]			

#### Table 7.6A.2.2.4.1-1: Test Configuration Table for 3DL CA

#### Table 7.6A.2.2.4.1-2: Void

#### Table 7.6A.2.2.4.1-3: Void

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.

- 3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and Reference Measurement Channel is set according to Tables 7.6A.2.2.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.2.2.4.3.

#### 7.6A.2.2.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.2.2.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format [1_1] for C_RNTI to transmit the DL RMC according to Tables 7.6A.2.2.4.1-1, 7.6A.2.2.4.1-2 or 7.6A.2.2.4.1-3 on both SCC and PCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Tables 7.6A.2.2.4.1-1, 7.6A.2.2.4.1-2 or 7.6A.2.2.4.1-3 on PCC. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6A.2.2.4.2-1.
- 7 Set the downlink signal level according to the Table 7.6A.2.2.4.2-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in table 7.6A.2.2.4.2-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8 Measure the average throughput for the carrier(s) indicated in Table 7.6A.2.2.4.2-1 for duration sufficient to achieve statistical significance according to Annex H.2A.
- 9 Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6A.2.2.4.2-1 in Case 1 at step 6.
- 10 Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth.
- 11. Repeat steps 1 to 10 for all component carriers listed in Table 7.6A.2.2.4.2-1.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

CA configuration	CA configuration ID in REFSENS	Throughput measured on	Table with test parameters to select				
Intra-band contiguous	1	PCC, SCC ₁ , SCC ₂	7.6A.2.2.5-3				
<u> </u>			7.6A.2.2.5-3a				
			7.6A.2.2.5-4				
			7.6A.2.2.5-4a				
Inter-band	1 ¹		7.6A.2.2.5-1				
	•		7.6A.2.2.5-1a				
	2 ¹	SCC1, SCC2	7.6A.2.2.5-1b				
		·	7.6A.2.2.5-2				
	3 ¹		7.6A.2.2.5-2a				
Intra-band contiguous +			7.6A.2.2.5-1				
Inter-band			7.6A.2.2.5-1a				
	1 ²	SCC2	7.6A.2.2.5-1b				
			7.6A.2.2.5-2				
			7.6A.2.2.5-2a				
			7.6A.2.2.5-3				
			7.6A.2.2.5-3a				
	2 ²	SCC1, SCC2	7.6A.2.2.5-4				
			7.6A.2.2.5-4a				
Intra-band non-			7.6A.2.2.5-1				
contiguous + Inter-band			7.6A.2.2.5-1a				
	2 ³	SCC2	7.6A.2.2.5-1b				
			7.6A.2.2.5-2				
			7.6A.2.2.5-2a				
			7.6A.2.2.5-1				
	3 ³	SCC1, SCC2	7.6A.2.2.5-1a				
	5-	3001, 3002	7.6A.2.2.5-2				
			7.6A.2.2.5-2a				
NOTE 1: CA configuration ID as defined in "Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)" in table 7.3A.2.4.1-1.							
NOTE 2: CA configuration ID as defined in "Default Test Settings for a CA_nXC-nYA, CA_nYA-nXC, CA_nYA-nXB and CA_nXB-nYA Configurations (Intra-band contiguous + Inter-band)" in table							
<ul> <li>7.3A.2.4.1-1.</li> <li>NOTE 3: CA configuration ID as defined in "Default Test Settings for a CA_nX(2A)-nYA Configuration (Intraband non-contiguous + Inter-band)" in table 7.3A.2.4.1-3.</li> </ul>							

#### Table 7.6A.2.2.4.2-1: Test repetition and measurement configuration

#### 7.6A.2.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

#### 7.6A.2.2.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables below, according to the type of CA. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

Table 7.6A.2.2.5-1: In-band blocking parameters for NR bands with FDL_high < 2700 MHz and FUL_high <
2700 MHz (inter-band, intra-band non-contiguous)

RX parameter	Units	Channel bandwidth						
-		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz		
Power in	dBm	R	EFSENS + chan	nel bandwidth s	pecific value belo	W		
transmission	dB	6	6	7	9	10		
bandwidth								
configuration								
BWinterferer	MHz			5				
Floffset, case 1	MHz			7.5				
Floffset, case 2	MHz			12.5				
RX parameter	Units		C	hannel bandwid	lth			
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Power in	dBm	R	EFSENS + chan	nel bandwidth s	pecific value belo	)W		
transmission								
bandwidth	dB	11	12	13	14	15		
configuration								
BWinterferer	MHz	5						
Floffset, case 1	MHz	7.5						
Floffset, case 2	MHz			12.5				
RX parameter	Units		C	hannel bandwid	lth			
		90 MHz	100 MHz					
Power in	dBm	DEESENIS	+ channel					
transmission			pecific value					
bandwidth			low					
configuration								
	dB	15.5	16					
BWinterferer	MHz		5					
Floffset, case 1	MHz	7	.5					
Floffset, case 2	MHz	12.5						
NOTE 1: The tra	ansmitter sh	all be set to 4 dE	B below PCMAX_L,	f,c at the minimur	n UL configuratio	on specified in		
			ned in clause 6.2					
NOTE 2: The inf								
		attern OP.1 FDD	D/TDD for the DL	-signal as descr	ibed in Annex A.	5.1.1/A.5.2.1		
and 15	kHz SCS.							

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	NR band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		Pinterferer	dBm	-56	-44	-15	-38	
$\begin{array}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –		-CBW/2-11	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				Floffset, case 1	Floffset, case 2			
Finterferer     MHz     NOTE 2     Flutterferer       n1, n2, n3, n5, n7, n8, n12, n14, n18, n20, n25, n26, n28, n34, n38, n39, n40, n41, n40, n41, n40, n41, n43, n50, n51, n53, n65, n66, n70, n74, n75, n76     MHz     NOTE 2     FDL_low - 15 to       n30     Finterferer     MHz     NOTE 2     FDL_low - 15 to     FDL_low - 11       n30     Finterferer     MHz     NOTE 2     FDL_low - 15 to     FDL_low - 12 FDL_high + 15       n71     Finterferer     MHz     NOTE 2     FDL_low - 12 FDL_high + 15     FDL_low - 12 FDL_high + 15       NOTE 1:     The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Fsetrer]/SCS] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.       NOTE 2:     For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1       NOTE 3:     n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
n1, n2, n3, n5, n7, n8, n12, n14, n18, n20, n25, n26, n28, n34, n38, n39, n40, n41, n75, n76       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 11         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 11         n70, n74, n75, n76       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 12         n71       Finterferer       MHz       NOTE 2       FDL_low - 12 to FDL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Fisterferer]/SCS] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause				CBW/2 +				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $					,			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		Finterferer	MHz	NOTE 2				
n18, n20,       n25, n26,         n28, n34,       n38, n39,         n40, n41,       n483, n50,         n51, n53,       n66,         n70, n74,       n75, n76         n30       Finterferer         MHz       NOTE 2         FDL_low - 15       FDL_low - 11         to       FDL_low - 12 to         r01       Finterferer         MHz       NOTE 2         FDL_low - 12 to         FDL_low - 12 to         FDL_high + 15         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to         ([] $F_{interferer}   / SCS ] + 0.5 )SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b): CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$					FDL_high + 15			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$								
n38,n39, n40, n41, n483, n50, n51, n53, n66, n70, n74, n75, n76       MHz       NOTE 2       FDL_low - 15 to       FDL_low - 11         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to       FDL_low - 12         n71       Finterferer       MHz       NOTE 2       FDL_low - 12 to FDL_low + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Finterferer   / SCS] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause	, ,							
n40, n41, n48³, n50, n51, n53, n65, n66, n70, n74, n75, n76MHzNOTE 2FDL_low - 15 to FDL_high + 15FDL_low - 11n30FinterfererMHzNOTE 2FDL_low - 12 to FDL_high + 15FDL_low - 12 FDL_high + 15n71FinterfererMHzNOTE 2FDL_low - 12 to FDL_high + 15FDL_low - 12 FDL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([Finterferer   / SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
$n48^3$ , $n50$ , $n51$ , $n53$ , $n55$ , $n66$ , $n70$ , $n74$ , $n75$ , $n76$ $F_{DL_low} - 15$ $F_{DL_low} - 11$ $n30$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 15$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $NOTE 1$ :       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS ] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.       NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - F_{loffset, case 1}         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	, ,							
n70, n74, n75, n76MHzNOTE 2 $F_{DL_low} - 15$ to FDL_high + 15 $F_{DL_low} - 11$ n30FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ ton71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ FDL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer}] / SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause	n51, n53,							
n75, n76MHzNOTE 2 $F_{DL_low} - 15$ to $F_{DL_low} - 11$ n30FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ ton71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ Foll_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS ] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause	n65, n66,							
n30FinterfererMHzNOTE 2 $F_{DL_low} - 15$ to FDL_high + 15 $F_{DL_low} - 11$ n71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ FDL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer}] / SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
Influence       Influence <thinfluence< th=""> <thinfluence< th=""> <thinfluence< th=""></thinfluence<></thinfluence<></thinfluence<>								
Influence       Full_high + 15         Influence       Finterferer         MHz       NOTE 2         FDL_low - 12 to FDL_low - 12 to FDL_high + 15         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer} /SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause	n30	Finterferer	MHz	NOTE 2			F _{DL_low} – 11	
n71FinterfererMHzNOTE 2 $F_{DL_low} - 12$ to $F_{DL_high} + 15$ $F_{DL_low} - 12$ NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer} /SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
Image: NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to         ([]F _{interferer} ]/SCS]+0.5)SCS       MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause	p71	E				E 12		
<ul> <li>NOTE 1: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([ F_{interferer} /SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.</li> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>	117.1	⊢ interferer		NOTE 2	—	FDL_low - 12		
<ul> <li>([]F_{interferer}   / SCS ] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.</li> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>								
<ul> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 – F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>	$\left[ \left  E_{\text{res}} \right  / SCS \right] + 0.5 \right] SCS$							
<ul> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 – F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>	MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer							
case 1; b: CBW/2 + Floffset, case 1 NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
				this frequency range	according to the go	oeral requirement d	ofined in Clause	
		•		una nequency fallye	according to the ger		cinica in Clause	

# Table 7.6A.2.2.5-1a: In-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz (inter-band, intra-band non-contiguous)

# 7.6A.2.2.5-1b: In-band blocking for additional NR operating bands for carrier aggregation with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz (inter-band)

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
			Floffset, case 1	Floffset, case 2			
			and	and			
			CBW/2 +	≥ CBW/2 +			
			Floffset, case 1	Floffset, case 2			
n29	Finterferer	MHz	NOTE 2	F _{DL_low} – 15			
				to			
				F _{DL_high} + 15			
NOTE 1: F	or certain bands, th	e unwante	ed modulated interfer	ring signal may not			
fa	all inside the UE rec	eive band	, but within the first 1	5 MHz below or			
	bove the UE receiv						
			e requirement applies				
			- Floffset, case 1; b: CB				
NOTE 3: T	he absolute value of	of the inter	ferer offset Finterfere	er (offset) shall be			
fu	further adjusted to $( F_{\text{interferer}}  / SCS   + 0.5)SCS$ MHz with SCS the						
	sub-carrier spacing of the wanted signal in MHz. The interferer is an						
			o that of the wanted				
NOTE 4: C	BW denotes the ch	annel ban	dwidth of the wanted	l signal			

bandwidth

BWinterferer

Floffset, case 1

NOTE 2:

configuration

dB

MHz

MHz

RX parameter	Units	Channel bandwidth						
-		10 MHz	15 MHz	20 MHz	25 MHz	30 MHz		
Power in	dBm	R	REFSENS + channel bandwidth specific value below					
transmission bandwidth configuration	dB	6						
BWinterferer	MHz	10	15	20	25	30		
Floffset, case 1	MHz	15	22.5	30	37.5	45		
Floffset, case 2	MHz	25	37.5	50	62.5	75		
RX parameter	Units		C	hannel bandwic	ith			
-		40 MHz	50 MHz	60 MHz	70 MHz	80 MHz		
Power in	dBm	R	EFSENS + chan	nel bandwidth s	pecific value belo	W		
transmission bandwidth configuration	dB			6				
BWinterferer	MHz	40	50	60	70	80		
Floffset, case 1	MHz	60	75	90	105	120		
Floffset, case 2	MHz	100	125	150	175	200		
RX parameter	Units	Channel bandwidth						
		90 MHz	100 MHz					
Power in	dBm	REFSENS	S + channel					
transmission		bandwidth s	specific value					

below

6

90

135

Table 7.3.2.3-3 with  $P_{CMAX_{L,f,c}}$  defined in clause 6.2.4.

#### Table 7.6A.2.2.5-2: In-band blocking parameters for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz (inter-band, intra-band non-contiguous)

Table 7.6A.2.2.5-2a: In-band blocking for NR bands with F _{DL_low} ≥ 3300 MHz and F _{UL_low} ≥ 3300 MHz
(inter-band, intra-band non-contiguous)

The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1

100

150 
 Floffset, case 2
 MHz
 225
 250

 NOTE 1:
 The transmitter shall be set to 4 dB below PCMAX_L,f,c at the minimum UL configuration specified in

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
n77, n78,	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
n79			Floffset, case 1	Floffset, case 2			
			and	and			
			BW/2 +	≥ CBW/2 +			
			Floffset, case 1	Floffset, case 2			
	Finterferer			F _{DL_low} – 3CBW			
			NOTE 2	to			
				F _{DL_high} + 3CBW			
NOTE 1: T	he absolute value of	of the inter	ferer offset Finterfere	er (offset) shall be			
fu	urther adjusted to (	$ F_{\rm interferer} $ /	$SCS \mid +0.5)SCS MH$	Iz with SCS the			
s	ub-carrier spacing of	of the want	ted signal in MHz. Th	ne interferer is an			
N	IR signal with an SC	CS equal to	o that of the wanted	signal.			
NOTE 2: F	For each carrier frequency, the requirement applies for two interferer						
с	carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1						
NOTE 3: C	BW denotes the ch	annel ban	dwidth of the wanted	l signal			

## Table 7.6A.2.2.5-3: In-band blocking parameters with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz (intraband contiguous CA)

Rx Parameter	Units		NR CA bandwidth c	NR CA bandwidth class			
		В	C	D			
Pw in		REFSE	NS + CA bandwidth class sp	pecific value below			
Transmission Bandwidth Configuration, per CC	dB	10.0	6	13.8			
BWInterferer MHz		20	BW _{channel} CA	50			
Floffset, case 1	MHz	30	BWchannel CA+ BWchannel CA/2	75			
Floffset, case 2	MHz	50	BWInterferer + Floffset, case 1	125			
				configuration specified in Ta	able		
<ul> <li>7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1</li> </ul>							

## Table 7.6A.2.2.5-3a: In-band blocking parameters with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz (intra-band contiguous CA)

Rx Parameter	Units	NR CA band	NR CA bandwidth class			
		В	С			
Pw in Transmission		REFSENS + NR CA bandwic	th class specific value below			
Bandwidth Configuration, per CC	dBm	16.0	19.0			
BWInterferer	MHz	5	5			
Floffset, case 1	MHz	7.5	7.5			
Floffset, case 2	MHz	12.5	12.5			
NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4. NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						

## Table7.6A.2.2.5-4: In-band blocking with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz (intra-band contiguous CA)

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
n77, n78,	Finterferer (offset)	MHz	-BWchannel CA/2 -Floffset, case 1	≤ -BW _{channel CA} /2 -Floffset, case 2			
n79			and	and			
			BWchannel CA/2 +Floffset, case 1	≥ BW _{channel CA} /2 +F _{loffset, case 2}			
	Finterferer	MHz		$F_{DL_{low}} - 3BW_{channel CA}$			
			NOTE 2	to			
				F _{DL_high} + 3BW _{channel CA}			
			er offset Finterferer (offset) shall be				
	$\left( \left  F_{\text{interferer}} \right  / SCS \right] +$	0.5) <i>SCS</i> MH	z with SCS the sub-carrier spacing o	f the carrier closest to the interferer in			
	MHz. The interferer	is an NR sigr	nal with an SCS equal to that of the c	closest carrier.			
NOTE 2:	For each carrier free	quency, the re	equirement applies for two interferer	carrier frequencies: a: -BW _{channel CA} /2 –			
	Floffset, case 1; b: BW channel CA/2 + Floffset, case 1						
NOTE 3:	BWchannel CA denotes	s the aggrega	ted channel bandwidth of the wanted	l signal			

NR	Parameter	Unit	Case 1	Case 2	Case 3		
band	Pinterferer	dBm	-56	-44			
n41,	Finterferer	MHz	-BWchannel CA/2 -Floffset, case 1	≤ -BW _{channel CA} /2 -F _{loffset, case 2}			
n66,	(offset)		and	and			
n484,			BWchannel CA/2 +Floffset, case 1	≥ BW _{channel CA} /2 +F _{loffset, case 2}			
n40	Finterferer	MHz		F _{DL_low} – 15			
			NOTE 2	to			
				F _{DL_high} + 15			
n71	Finterferer	MHz		$F_{DL_{low}} - 12$	$F_{DL_{low}} - 12$		
			NOTE 2	to			
				F _{DL_high} + 15			
NOTE 1				(offset) shall be further adjusted			
	$\left( \left  F_{\text{interferer}} \right  \right)$	SCS   + 0	0.5ig)SCS MHz with SCS the su	ub-carrier spacing of the carrier c	losest to the interferer in		
	MHz. The in	terferer i	is an NR signal with 15 kHz S	CS.			
NOTE 2	2: For each ca	rrier freq	uency, the requirement applie	es for two interferer carrier freque	ncies: a: -BW _{channel CA} /2		
- Floffset, case 1; b: BWchannel CA/2 + Floffset, case 1							
NOTE 3: BW _{channel CA} denotes the aggregated channel bandwidth of the wanted signal							
NOTE 3. DWename CA denotes the aggregated channel bandwidth of the wanted signal NOTE 4: n48 follows the requirement in this frequency range according to the general requirement defined in Clause 7.1A.							

## Table 7.6A.2.2.5-4a: In-band blocking with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz (intra-band contiguous CA)

For the UE which supports inter-band CA configuration in Table 7.3A.3.2.3-1,  $P_{interferer}$  power defined in Table 7.6A.2.2.5-1a and Table 7.6A.2.2.5-2a is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.3.2.3-1.

### 7.6A.2.3 In-band Blocking for CA (4DL CA)

7.6A.2.3.1 Test purpose

Same test purpose as in clause 7.6A.2.1.

7.6A.2.3.2 Test applicability

This test applies to all types of NR UE release 15 and forward that support 4DL CA.

#### 7.6A.2.3.3 Minimum conformance requirements

Minimum requirements are defined in clause 7.6A.2.0.

7.6A.2.3.4 Test description

#### 7.6A.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configuration specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in table 7.6A.2.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

			Defa	ult Conditior	IS		
Test E	Environme	ent as specified in	Normal		13		
		subclause 4.1					
		es as specified in TS	NOTE 1				
		bclause 4.3.1					
		nation setting	Highest N _{RB}	_agg, NOTE 1	, NOTE 5		
		cified in Tables					
		2-1, or tables in					
		x for the CA					
Configuration across bandwidth combination sets supported by the							
UE.							
	SCS as sp	ecified in Table	Lowest for F	PCC and SCC	Cs		
5.3.5-							
Netwo	ork signall	ing value	NS_01				
						e band with active upl	ink carrier
		<u> </u>		t Parameters	5		
Test	00	Downlin	k Configurat SCC1 RB		0000 00	Uplink Config	uration PCC RB
Test ID	CC Mod'n	PCC RB allocation		SCC2 RB allocation	SCC3 RB allocation	CC Mod'n	
		efault Test Settings	allocation				allocation
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
-	OFDM					QPSK	
	QPSK						
Default Test Settings for a CA_nXA-nYA-nZA Configuration (Inter-band)							
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM					QPSK	
	QPSK					74 Osufisuus tisus	
	L	Default Test Settings for	or a CA_nXC- (Intra-band co			-ZA Configurations	
1	CP-	NOTE 1	(IIIIa-ballu cu	NOTE 1	iter-banu)	DFT-s-OFDM	NOTE 1
•	OFDM	NOTET		NOTE 1		QPSK	NOTE
	QPSK						
	•				nYA-ZA Confi	gurations	
		(In	tra-band non		- Inter-band)		
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM					QPSK	
	QPSK	Dofault Toot	Settings for a	$(\Delta nY(2A))$	nY(2A) Config	l	1
					and non-conti		
1	CP-	NOTE 1		NOTE 1		DFT-s-OFDM	NOTE 1
	OFDM					QPSK	
	QPSK						
NOTE		specific configuration of					
NOTE		ving non-exceptional R					
NOTE 2: CA Configuration Test CC Combination test settings are checked separately for each CA							
Configuration. NOTE 3: Inter-band: X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n3A-							
n8A, X=1, Y=3, Z=8; <b>Intra-band contiguous + Inter-band:</b> X,Y correspond to the different							
bands in the CA Configuration, e.g. for CA_1C-3A, X=1,Y=3; Intra-band non-contiguous + Inter-							
band: X and Y correspond to the different bands in the CA Configuration. E.g. for CA_n1A-n1A-							
n8A, X=1, Y =8							
NOTE							
NOTE		ected and 4Rx REFS					
NOTE		UE supports multiple bination with the highe			A Configuration	on with the same NRB	agg, only the
	COIN	smallon with the highe	SUNRD_FUU	เอ เฮอเฮน.			

#### Table 7.6A.2.3.4.1-1: Test Configuration Table for 4DL CA

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.

- 3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and Reference Measurement Channel is set according to Tables 7.6A.2.3.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.2.2.4.3.

#### 7.6A.2.3.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.2.3.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format [1_1] for C_RNTI to transmit the DL RMC according to Table 7.6A.2.3.4.1-1 on both SCC and PCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.6A.2.3.4.1-1 on PCC. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6A.2.3.4.2-1.
- 7 Set the downlink signal level according to the Table 7.6A.2.3.4.2-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in table 7.6A.2.2.4.2-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8 Measure the average throughput for the carrier(s) indicated in Table 7.6A.2.3.4.2-1 for duration sufficient to achieve statistical significance according to Annex H.2A.
- 9 Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6A.2.3.4.2-1 in Case 1 at step 6.
- 10 Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth.
- 11. Repeat steps 1 to 10 for all component carriers listed in Table 7.6A.2.3.4.2-1.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

CA configuration	CA configuration ID in REFSENS	Throughput measured on	Table with test parameters to select
Intra-band contiguous	1	PCC, SCC1, SCC2,	7.6A.2.3.5-3
		SCC3	7.6A.2.3.5-3a
			7.6A.2.3.5-4
			7.6A.2.3.5-4a
Inter-band	11		7.6A.2.3.5-1
	1.		7.6A.2.3.5-1a
	2 ¹	SCC1, SCC2, SCC3	7.6A.2.3.5-1b
	<u> </u>	0001, 0002, 0000	7.6A.2.3.5-2
	3 ¹		7.6A.2.3.5-2a
Intra-band contiguous +			7.6A.2.3.5-1
Inter-band			7.6A.2.3.5-1a
	1 ²	SCC2, SCC3	7.6A.2.3.5-1b
	'	0002, 0000	7.6A.2.3.5-2
			7.6A.2.3.5-2a
			7.6A.2.3.5-3
	2 ²	8001 8002 8002	7.6A.2.3.5-3a
	Z ²	SCC1, SCC2, SCC3	7.6A.2.3.5-4
			7.6A.2.3.5-4a
			7.6A.2.3.5-3
		SCC1, SCC2, SCC3	7.6A.2.3.5-3a
	3 ²		7.6A.2.3.5-4
			7.6A.2.3.5-4a
			1.0/1.2.0.0 14
ntra-band non-			7.6A.2.3.5-1
contiguous + Inter-band		SCC2, SCC3	7.6A.2.3.5-1a
	1 ³		7.6A.2.3.5-1b
			7.6A.2.3.5-2
			7.6A.2.3.5-2a
		SCC1, SCC2, SCC3	7.6A.2.3.5-1
			7.6A.2.3.5-1a
	2 ³		7.6A.2.3.5-1b
	-		7.6A.2.3.5-2
			7.6A.2.3.5-2a
			7.6A.2.3.5-1
	- 0		7.6A.2.3.5-1a
	3 ³	SCC1, SCC2, SCC3	7.6A.2.3.5-2
			7.6A.2.3.5-2a
			7.6A.2.3.5-1
			7.6A.2.3.5-1a
	1 ⁴	SCC2, SCC3	7.6A.2.3.5-1a 7.6A.2.3.5-2
ntra-band non-			7.6A.2.3.5-2 7.6A.2.3.5-2a
contiguous + Intra-band			
non-contiguous			7.6A.2.3.5-1
-	24	SCC2, SCC3	7.6A.2.3.5-1a
			7.6A.2.3.5-2
OTE 1: CA configuration	L as defined in "Dofault To	st Settings for a CA_nXA-nY	7.6A.2.3.5-2a
(Inter-band)" in NOTE 2: CA configuration Configurations ( NOTE 3: CA configuration (Intra-band non-	table 7.3A.3.4.1-1. n ID as defined in "Default Te (Intra-band contiguous + Inter n ID as defined in "Default Te -contiguous + Inter-band)" in	est Settings for a CA_XC-YA- r-band)" in table 7.3A.3.4.1-1. est Settings for a CA_nX(2A)- table 7.3A.3.4.1-1.	ZA and CA_XB-YA-ZA nYA-nZA Configuration
NOTE 3: CA configuration (Intra-band non- NOTE 4: CA configuration	n ID as defined in "Default Te -contiguous + Inter-band)" in n ID as defined in "Default Te	est Settings for a CA_nX(2A)-	nYA-nZA Configu nY(2A) Configura

#### Table 7.6A.2.3.4.2-1: Test repetition and measurement configuration

### 7.6A.2.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

### 7.6A.2.3.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables below, according to the type of CA.

## Table 7.6A.2.3.5-1: In-band blocking parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz (inter-band, intra-band non-contiguous)

RX parameter	Units	Channel bandwidth						
-		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz		
Power in	dBm	R	EFSENS + chan	nel bandwidth s	pecific value belo	)W		
transmission	dB	6	6	7	9	10		
bandwidth								
configuration								
BWinterferer	MHz			5				
Floffset, case 1	MHz			7.5				
Floffset, case 2	MHz			12.5				
RX parameter	Units		C	hannel bandwid	lth			
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Power in	dBm	R	EFSENS + chan	nel bandwidth s	becific value belo	W		
transmission								
bandwidth	dB	11	12	13	14	15		
configuration								
BWinterferer	MHz		5					
Floffset, case 1	MHz			7.5				
Floffset, case 2	MHz			12.5				
RX parameter	Units		C	hannel bandwid	lth			
		90 MHz	100 MHz					
Power in	dBm	REESENS	S + channel					
transmission			pecific value					
bandwidth			low					
configuration								
	dB	15.5	16					
BWinterferer	MHz		5					
Floffset, case 1	MHz		.5					
Floffset, case 2	MHz		2.5					
NOTE 1: The tra					n UL configuratio	on specified i		
			ned in clause 6.2					
			specified in Anr					
		attern OP.1 FDI	D/TDD for the DL	-signal as descri	bed in Annex A.	5.1.1/A.5.2.1		
and 15	5 kHz SCS.							

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	NR band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		Pinterferer	dBm	-56	-44	-15	-38	
$\begin{array}{ c c c c c c } \hline \begin{tabular}{ c c c c c } & and & and & & and & & & & & & & & & & & & & & & & & & &$		Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –		-CBW/2-11	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				Floffset, case 1	Floffset, case 2			
Flotfset, case 1         Flotfset, case 2           n1, n2, n3, n5, n7, n8, n12, n14, n18, n20, n25, n26, n28, n34, n38, n39, n40, n41, n40, n41, n40, n41, n40, n41, n43, n50, n51, n53, n65, n66, n70, n74, n75, n76         MHz         NOTE 2         FDL_low - 15 to FDL_high + 15           n30         Finterferer         MHz         NOTE 2         FDL_low - 15 to FDL_high + 15           n31, n53, n65, n66, n70, n74, n75, n76         MHz         NOTE 2         FDL_low - 15 to FDL_high + 15           n71         Finterferer         MHz         NOTE 2         FDL_low - 12 FDL_high + 15           NOTE 1:         The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([[Fauerferer]/SCS] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.           NOTE 2:         For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1								
n1, n2, n3, n5, n7, n8, n12, n14, n18, n20, n25, n26, n28, n34, n38, n39, n40, n41, n75, n76       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 11         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 11         n70, n74, n75, n76       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 12         n71       Finterferer       MHz       NOTE 2       FDL_low - 12 to FDL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([Fisuerferer]/SCS] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause				CBW/2 +				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				,	,			
$\begin{array}{ c c c c c c } n12, n14, & & & & & & & & & & & & & & & & & & &$		Finterferer	MHz	NOTE 2				
n18, n20,       n25, n26,         n28, n34,       n38, n39,         n40, n41,       n483, n50,         n51, n53,       n66,         n70, n74,       n75, n76         n30       Finterferer         MHz       NOTE 2         FDL_low - 15       FDL_low - 11         to       FDL_low - 12 to         r01       Finterferer         MHz       NOTE 2         FDL_low - 12 to         FDL_low - 12 to         FDL_high + 15         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to         ([] $F_{interferer}   / SCS ] + 0.5 )SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b): CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$					FDL_high + 15			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$								
n38,n39, n40, n41, n483, n50, n51, n53, n65, n66, n70, n74, n75, n76       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 11         n30       Finterferer       MHz       NOTE 2       FDL_low - 15 to FDL_high + 15       FDL_low - 12         n71       Finterferer       MHz       NOTE 2       FDL_low - 12 to FDL_high + 15       FDL_low - 12         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([[Finterferer] / SCS] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause	, ,							
n40, n41, n48³, n50, n51, n53, n65, n66, n70, n74, n75, n76MHzNOTE 2FDL_low - 15 to FDL_high + 15FDL_low - 11n30FinterfererMHzNOTE 2FDL_low - 12 to FDL_high + 15FDL_low - 12 To Solution with the interferer offset Finterferer (offset) shall be further adjusted to $([Finterferer   SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
$n48^3$ , $n50$ , $n51$ , $n53$ , $n55$ , $n66$ , $n70$ , $n74$ , $n75$ , $n76$ $F_{DL_low} - 15$ $F_{DL_low} - 11$ $n30$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 15$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $n71$ Finterferer       MHz       NOTE 2 $F_{DL_low} - 12$ to $F_{DL_low} - 12$ $F_{DL_low} - 12$ $NOTE 1$ :       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS ] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.       NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - F_{loffset, case 1}         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	, ,							
n70, n74, n75, n76MHzNOTE 2 $F_{DL_low} - 15$ to FDL_high + 15 $F_{DL_low} - 11$ n30FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ ton71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ FDL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer}] / SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause	n51, n53,							
n75, n76MHzNOTE 2 $F_{DL_low} - 15$ to $F_{DL_low} - 11$ n30FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ ton71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ Foll_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([F_{interferer}   / SCS ] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause	n65, n66,							
n30FinterfererMHzNOTE 2 $F_{DL_low} - 15$ to FDL_high + 15 $F_{DL_low} - 11$ n71FinterfererMHzNOTE 2 $F_{DL_high} + 15$ $F_{DL_low} - 12$ FDL_high + 15NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer}] / SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
Influence       Influence <thinfluence< th=""> <thinfluence< th=""> <thinfluence< th=""></thinfluence<></thinfluence<></thinfluence<>								
Influence       Full_high + 15         Influence       Finterferer         MHz       NOTE 2         FDL_low - 12 to FDL_low - 12 to FDL_high + 15         NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer} /SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause	n30	Finterferer	MHz	NOTE 2			F _{DL_low} – 11	
n71FinterfererMHzNOTE 2 $F_{DL_low} - 12$ to $F_{DL_high} + 15$ $F_{DL_low} - 12$ NOTE 1:The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to $([]F_{interferer} /SCS] + 0.5)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.NOTE 2:For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1NOTE 3:n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
NOTE 1:       The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to         ([]F _{interferer} ]/SCS]+0.5)SCS       MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.         NOTE 2:       For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1         NOTE 3:       n48 follows the requirement in this frequency range according to the general requirement defined in Clause	p71	E				E 12		
<ul> <li>NOTE 1: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to ([ F_{interferer} /SCS]+0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.</li> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>	n7 i		IVITZ	NOTE 2	—	FDL_low - 12		
<ul> <li>([]F_{interferer}   / SCS ] + 0.5)SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.</li> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 - F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>								
<ul> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 – F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>	$\left[ \frac{ F }{ F } + \frac{ F }{ F } \right] + 0.5 SCS$							
<ul> <li>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 – F_{loffset, case 1}; b: CBW/2 + F_{loffset, case 1}</li> <li>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause</li> </ul>	MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer							
case 1; b: CBW/2 + Floffset, case 1 NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause								
				this frequency range	according to the go	peral requirement d	afined in Clause	
		•		una nequency fallye	according to the ger			

# Table 7.6A.2.3.5-1a: In-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz (inter-band, intra-band non-contiguous)

# 7.6A.2.3.5-1b: In-band blocking for additional NR operating bands for carrier aggregation with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz (inter-band)

NR band	Parameter	Unit	Case 1	Case 2				
	Pinterferer	dBm	-56	-44				
	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –				
			Floffset, case 1	Floffset, case 2				
			and	and				
			CBW/2 +	≥ CBW/2 +				
			Floffset, case 1	Floffset, case 2				
n29	Finterferer	MHz	NOTE 2	F _{DL_low} – 15				
				to				
				F _{DL_high} + 15				
NOTE 1: F	or certain bands, th	e unwante	ed modulated interfer	ring signal may not				
fa	all inside the UE rec	eive band	, but within the first 1	5 MHz below or				
	bove the UE receiv							
			e requirement applies					
			- Floffset, case 1; b: CB					
NOTE 3: T	he absolute value of	of the inter	ferer offset Finterfere	er (offset) shall be				
fu	further adjusted to $( F_{\text{interferer}}  / SCS   + 0.5)SCS$ MHz with SCS the							
	sub-carrier spacing of the wanted signal in MHz. The interferer is an							
			o that of the wanted					
NOTE 4: C	BW denotes the ch	annel ban	dwidth of the wanted	l signal				

Table 7.6A.2.3.5-2: In-band blocking parameters for NR bands with F _{DL_low} ≥ 3300 MHz and F _{UL_low} ≥
3300 MHz (inter-band, intra-band non-contiguous)

RX parameter	Units		C	hannel bandwid	th	
-		10 MHz	15 MHz	20 MHz	25 MHz	30 MHz
Power in	dBm	R	EFSENS + chan	nel bandwidth sp	becific value belo	Ŵ
transmission	dB			6		
bandwidth						
configuration			-			
BWinterferer	MHz	10	15	20	25	30
Floffset, case 1	MHz	15	22.5	30	37.5	45
Floffset, case 2	MHz	25	37.5	50	62.5	75
RX parameter	Units		C	hannel bandwid	th	
		40 MHz	50 MHz	60 MHz	70 MHz	80 MHz
Power in	dBm	R	EFSENS + chan	nel bandwidth sp	pecific value belo	w
transmission	dB			6		
bandwidth						
configuration					-	
BWinterferer	MHz	40	50	60	70	80
Floffset, case 1	MHz	60	75	90	105	120
Floffset, case 2	MHz	100	125	150	175	200
RX parameter	Units		C	hannel bandwid	th	
		90 MHz	100 MHz			
Power in	dBm	REFSENS	6 + channel			
transmission		bandwidth s	pecific value			
bandwidth		be	low			
configuration	dB	(	6			
BWinterferer	MHz	90	100			
Floffset, case 1	MHz	135	150			
Floffset, case 2	MHz	225	250			
NOTE 1: The tra					n UL configuratio	n specified i
			ned in clause 6.2		-	
NOTE 2: The int						
dynam	ic OCNG Pa	attern OP 1 FDF	D/TDD for the DL	-signal as descri	had in Anney A	511/0521

# Table 7.6A.2.3.5-2a: In-band blocking for NR bands with $F_{DL_{low}} \ge 3300 \text{ MHz}$ and $F_{UL_{low}} \ge 3300 \text{ MHz}$ (inter-band, intra-band non-contiguous)

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
n77, n78,	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
n79			Floffset, case 1	Floffset, case 2			
			and	and			
			BW/2 +	≥ CBW/2 +			
			Floffset, case 1	Floffset, case 2			
	Finterferer			F _{DL_low} – 3CBW			
			NOTE 2	to			
				F _{DL_high} + 3CBW			
NOTE 1: T	he absolute value of	of the inter	ferer offset Finterfere	er (offset) shall be			
fu	urther adjusted to (	$ F_{\rm interferer} $ /	SCS + 0.5 SCS MH	Iz with SCS the			
s	sub-carrier spacing of the wanted signal in MHz. The interferer is an						
	NR signal with an SCS equal to that of the wanted signal.						
	For each carrier frequency, the requirement applies for two interferer						
c	carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1						
NOTE 3: C	BW denotes the ch	annel ban	dwidth of the wanted	l signal			

## Table 7.6A.2.3.5-3: In-band blocking parameters with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz (intraband contiguous CA)

<b>Rx Parameter</b>	Units		NR CA bandwidth c	lass	
		В	С	D	
Pw in		REFSE	NS + CA bandwidth class s	pecific value below	
Transmission Bandwidth Configuration, per CC	dB	10.0	6	13.8	
BWInterferer	MHz	20	BW _{channel} CA	50	
Floffset, case 1	MHz	30	BWchannel CA+ BWchannel	75	
			ca/2		
Floffset, case 2	MHz	50	BWInterferer + Floffset, case 1	125	
NOTE 1: The ti	ransmitte	r shall be set to 4dB below F	P _{CMAX_L,f,c} at the minimum UL	_ configuration specified in Tage	able
7.3.2.	3-3 with I	P _{CMAX_L,f,c} defined in clause 6	6.2.4.		
NOTE 2: The ir	nterferer o	consists of the Reference m	easurement channel specifie	ed in Annexes A.3.2 and A.3.	.3 with
one s	ided dyna	amic OCNG Pattern OP.1 Fl	DD/TDD as described in Ani	nex A.5.1.1/A.5.2.1 and set-u	цр
accor	ding to A	nnex C.3.1			

## Table 7.6A.2.3.5-3a: In-band blocking parameters with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz (intra-band contiguous CA)

Rx Parameter	Units	NR CA bandwidth class		
		В	С	
Pw in Transmission		REFSENS + NR CA bandwid	th class specific value below	
Bandwidth Configuration, per CC	dBm	16.0	19.0	
BWInterferer	MHz	5	5	
Floffset, case 1	MHz	7.5	7.5	
Floffset, case 2	MHz	12.5	12.5	
7.3.2.3-3 with P _{CM} NOTE 2: The interferer cons	AX_L,f,c define sists of the l c OCNG Pa	4 dB below $P_{CMAX_L,f,c}$ at the minimum L ed in clause 6.2.4. Reference measurement channel specif ttern OP.1 FDD/TDD as described in Ar	ied in Annexes A.3.2 and A.3.3 with	

## Table7.6A.2.3.5-4: In-band blocking with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz (intra-band contiguous CA)

NR band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
n77, n78,	Finterferer (offset)	MHz	-BWchannel CA/2 -Floffset, case 1	≤ -BW _{channel CA} /2 -Floffset, case 2			
n79			and	and			
			BWchannel CA/2 +Floffset, case 1	$\geq$ BW _{channel CA} /2 +F _{loffset, case 2}			
	Finterferer	MHz		FDL_low – 3BWchannel CA			
			NOTE 2	to			
				F _{DL_high} + 3BW _{channel CA}			
	NOTE 1: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to						
	$\left( \left  F_{\text{interferer}} \right  / SCS \right  +$	0.5) <i>SCS</i> MH	z with SCS the sub-carrier spacing o	f the carrier closest to the interferer in			
	MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier.						
NOTE 2:	Provide the second s						
	Floffset, case 1; b: BWcł			-			
NOTE 3:	BW _{channel CA} denotes the aggregated channel bandwidth of the wanted signal						

NR	Parameter	Unit	Case 1	Case 2	Case 3		
band	Pinterferer	dBm	-56	-44			
n41,	Finterferer	MHz	-BWchannel CA/2 -Floffset, case 1	≤ -BW _{channel CA} /2 -F _{loffset, case 2}			
n66,	(offset)		and	and			
n484,			BWchannel CA/2 +Floffset, case 1	≥ BW _{channel CA} /2 +F _{loffset, case 2}			
n40	Finterferer	MHz		F _{DL_low} – 15			
			NOTE 2	to			
				F _{DL_high} + 15			
n71	Finterferer	MHz		F _{DL_low} – 12	F _{DL_low} – 12		
			NOTE 2	to			
				F _{DL_high} + 15			
NOTE '	NOTE 1: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to						
	$\left( \left  F_{\text{interferer}} \right  \right)$	SCS   + 0	0.5)SCS MHz with SCS the su	ub-carrier spacing of the carrier o	closest to the interferer in		
	MHz. The in	terferer i	is an NR signal with 15 kHz S	CS.			
NOTE 2	2: For each ca	rrier freq	uency, the requirement applie	es for two interferer carrier freque	encies: a: -BW _{channel CA} /2		
			channel CA/2 + Floffset, case 1				
NOTE 3	3: BWchannel CA	denotes	the aggregated channel band	width of the wanted signal			
NOTE 4	4: n48 follows 7.1A.	the requ	irement in this frequency rang	e according to the general requir	rement defined in Clause		

## Table 7.6A.2.3.5-4a: In-band blocking with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz (intra-band contiguous CA)

For the UE which supports inter-band CA configuration in Table 7.3A.3.2.3-1,  $P_{interferer}$  power defined in Table 7.6A.2.3.5-1a and Table 7.6A.2.3.5-2a is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.3.2.3-1.

### 7.6A.3 Out-of-band blocking for CA

### 7.6A.3.0 Minimum conformance requirements

### 7.6A.3.0.1 Out-of-band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test.

The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Tables 7.6A.3.0.1-1 and Tables 7.6A.3.0.1-2 being on either side of the aggregated signal. The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

Table 7.6A.3.0.1-1: Out-of-band blocking parameters for intra-band contiguous CA
----------------------------------------------------------------------------------

RX parameter	Uni		CA bandwidth class					
	ts	В	С	D				
Power in	dB	RE	REFSENS + CA bandwidth class specific value below					
transmission	m							
bandwidth	dB	9	9 9 9					
configuration								
NOTE 1: The transmitter shall be set to 4 dB below PCMAX_L,f,c at the minimum UL configuration specified in Table								
7.3.2.3-3 w	7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.							

NR band	Parameter	Unit	Range1	Range 2	Range 3
	Pinterferer	dBm	-45	-30	-15
n41, n48⁵, n66, n71	Finterferer (CW)	MHz	-60 < f – F _{DL_low} < -15 or 15 < f – F _{DL_high} < 60	-85 < f – F _{DL_low} ≤ -60 or 60 ≤ f – F _{DL_high} < 85	$1 \le f \le F_{DL_{low}} - 85$ or $F_{DL_{high}} + 85 \le f$ $\le 12750$
n77, n78 (NOTE 3)	Finterferer (CW)	MHz	N/A	N/A	$\label{eq:started_loss} \begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel_CA}) \\ or \\ F_{DL_high} + MAX(200,3^*BW_{Channel_CA}) \\ \leq f \leq 12750 \end{array}$
n79 (NOTE 4)	F _{interferer} (CW)	MHz	N/A	N/A	$eq:started_linear_lin$
NOTE 2:	BW _{Channel_CA} den The power level o F _{Interferer} < 4800 MI from the frequency	otes the ag f the interfe Hz. For BV / offset of	ggregated channel bandv erer (P _{Interferer} ) for Range 3 V _{Channel_CA} > 15 MHz, the 3*BW _{Channel_CA} from the	vidth of the wanted signal 3 shall be modified to -20 e requirement for Range band edge. For BW _{Chann}	dBm for F _{Interferer} > 6000 MHz. dBm, for F _{Interferer} > 2700 MHz and 1 is not applicable and Range 2 applies _{el_CA} larger than 60 MHz, the ency offset of 3*BW _{Channel_CA} from the
NOTE 4: NOTE 5:	The power level of F _{Interferer} < 5750 MI from the frequency	Hz. For BV y offset of f the interfe	V _{Channel_CA} ≥ 40 MHz, the 3*BW _{Channel_CA} from the	e requirement for Range 2 band edge.	dBm, for F _{Interferer} > 3650 MHz and 2 is not applicable and Range 3 applies dBm for F _{Interferer} > 2700 MHz and

#### Table 7.6A.3.0.1-2: Out of-band blocking for intra-band contiguous CA

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6A.3-2, a maximum of

 $\left\lfloor \max\left\{24,6\cdot\left\lceil n\cdot N_{RB} / 6\right\rceil\right\} / \min\left\{\left\lfloor n\cdot N_{RB} / 10\right\rfloor,5\right\}\right\rfloor$ 

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(\lfloor BW_{channel}/2 \rfloor, 5)$  MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration, BW_{Channel} is the bandwidth of the frequency channel in MHz and n = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in subclause 7.7A.1 apply.

### 7.6A.3.0.2 Out-of-band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, the out-of-band blocking requirements are defined with the uplink configuration in accordance with table 7.3A.0.2.3-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclauses 7.6.3 and 7.6A.3.0.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply with all downlink carriers active.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.6A.3.0.3 Out-of-band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the out-of-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.6.3 for each component carrier while all downlink carriers are active.

For inter-band carrier aggregation with component carriers in operating bands < 2.7GHz including n48, and for  $F_{DL_Low(j)} - 15$  MHz  $\leq f \leq F_{DL_High(j)} + 15$  MHz, the appropriate adjacent channel selectivity and in-band blocking

requirements in the respective subclauses 7.5 and 7.6.2 shall be applied for carrier *j*. For inter-band carrier aggregation with component carriers in operating bands > 2.7GHz excluding n48, and for  $F_{DL_Low(j)} - 3^* BW_{Channel} \le f \le F_{DL_High(j)} + 3^* BW_{Channel}$ , the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5 and 7.6.2 shall be applied for carrier *j*.  $F_{DL_Low(j)}$  and  $F_{DL_High(j)}$  denote the respective lower and upper frequency limits of the operating band containing carrier *j*, *j* = 1,...,X, with carriers numbered in increasing order of carrier frequency and X the number of component carriers in the band combination.  $BW_{Channel}$  denotes the channel bandwidth of the wanted signal component carrier *j*. If CW interferer falls in a gap between  $F_{DL_High(j)}$  and  $F_{DL_Low(j+1)}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

For inter-band carrier aggregation with uplink assigned to two NR bands, the out-of-band blocking requirements specified in subclause 7.6.3 shall be met with the transmitter power for the uplink set to 7 dB below  $P_{CMAX_L,f,c}$  for each serving cell c.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.6.3.3-2 and 7.6.3.3-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

For inter-band CA combination listed in Table 7.6A.3.0.3-1, exceptions to the requirement specified in Table 7.6A.3.0.3-2 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

Table 7.6A.3.0.3-1: CA band combination with exceptions allowed
-----------------------------------------------------------------

CA band combination
CA_n8-n78
CA_n8-n79
CA_n28-n78

#### Table 7.6A.3.0.3-2: Requirement for out-of-band blocking exceptions

Parameter	Unit	Level
P _{Interferer} (CW)	dBm	-441
where $f_{UL}^{LB}$ and $f_{UL}^{LB}$ and for and higher frequencies channel bandwice	applies when $ f_{Interferer} \pm f_{Interferer} $ $f_{DL}^{HB}$ are the carrier frequencies ency band DL, respectively. Aths configured for lower freed $f_{DL}$ band DL carrier in MHz, respectively.	uency band UL carrier and

For all interferer frequency ranges specified in subclause 7.6.3 a maximum of

 $\left\lfloor \max\left\{24,6\cdot\left\lceil n\cdot N_{RB}/6\right\rceil\right\}/\min\left\{\left\lfloor n\cdot N_{RB}/10\right\rfloor,5\right\}\right\rfloor$ 

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of min( $[BW_{channel}/2]$ ,5) MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration, BW_{Channel} the bandwidth of the frequency channel in MHz and n = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in subclause 7.7 apply.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6A.3.

### 7.6A.3.1 Out-of-band blocking for CA (2DL CA)

#### 7.6A.3.1.1 Test purpose

Out-of-band band blocking for CA is defined for an unwanted CW interfering signal falling more than 15 MHz or 3*BW_{Channel_CA} below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz or 3* BW_{Channel_CA} below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5A and sub-clause 7.6A.2 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6A.3.1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 2DL CA.

7.6A.3.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.6A.3.0.

7.6A.3.1.4 Test description

7.6A.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in table 7.6A.3.1.4.1-1, 7.6A.3.1.4.1-2 or 7.6A.3.1.4.1-3. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

#### Table 7.6A.3.1.4.1-1: Test configuration table for Intra-band contiguous CA

		D	efault Conditio	ons	
Test E	Environment as specified	d in TS 38.508-	Normal		
1 [5] s	subclause 4.1				
Test F	requencies as specified	l in TS 38.508-1	Mid range		
[5] sub	bclause 4.3.1				
Test C	CC Combination setting	(N _{RB_agg} ) as	Highest N _{RB_ag}	19	
specif	ied in Table 5.5A.1-1 fo	r the CA	NOTE 3		
	guration across bandwid	Ith combination			
	upported by the UE.				
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest		
			Test Parameter	rs	
	Downlii	nk Configuration		Uplink Config	juration
Test	Downlin CC				Juration PCC RB
Test ID		nk Configuration	1	Uplink Config	
	CC	nk Configuration PCC RB	SCC RB	Uplink Config CC	PCC RB
ID 1	CC Mod'n CP-OFDM QPSK	nk Configuration PCC RB allocation Full RB ¹	SCC RB allocation Full RB ¹	Uplink Config CC Mod'n	PCC RB allocation REFSENS ²
ID 1 NOTE	CC Mod'n CP-OFDM QPSK 1: Full RB allocation s	nk Configuration PCC RB allocation Full RB ¹ shall be used per	SCC RB allocation Full RB ¹ each SCS and c	Uplink Config CC Mod'n DFT-s-OFDM QPSK	PCC RB allocation REFSENS ² Table 7.3.2.4.1-2.
ID 1 NOTE	CC Mod'n CP-OFDM QPSK 1: Full RB allocation s	nk Configuration PCC RB allocation Full RB ¹ shall be used per	SCC RB allocation Full RB ¹ each SCS and c	Uplink Config CC Mod'n DFT-s-OFDM QPSK channel BW as specified in 1	PCC RB allocation REFSENS ² Table 7.3.2.4.1-2.
ID 1 NOTE NOTE	CC Mod'n CP-OFDM QPSK 1: Full RB allocation s 2: REFSENS refers to 7.3.2.4.1-3. 3: If the UE supports	nk Configuration PCC RB allocation Full RB ¹ shall be used per the single carrie multiple CC Com	SCC RB allocation Full RB ¹ each SCS and c or Uplink RB allo binations in the	Uplink Config CC Mod'n DFT-s-OFDM QPSK channel BW as specified in T cation for reference sensitivi CA Configuration with the sa	PCC RB allocation REFSENS ² Fable 7.3.2.4.1-2. ty according to table
ID 1 NOTE NOTE	CC Mod'n CP-OFDM QPSK 1: Full RB allocation s 2: REFSENS refers to 7.3.2.4.1-3. 3: If the UE supports the combination wi	nk Configuration PCC RB allocation Full RB ¹ shall be used per the single carrie multiple CC Com th the highest NR	SCC RB allocation Full RB ¹ each SCS and c or Uplink RB allo binations in the B_PCC is tested	Uplink Config CC Mod'n DFT-s-OFDM QPSK channel BW as specified in T cation for reference sensitivi CA Configuration with the sa	PCC RB allocation REFSENS ² Fable 7.3.2.4.1-2. ty according to table ame NRB_agg, only
ID 1 NOTE NOTE	CC Mod'n CP-OFDM QPSK 1: Full RB allocation s 2: REFSENS refers to 7.3.2.4.1-3. 3: If the UE supports the combination wi 4: In a band where U	<b>hk Configuration</b> <b>PCC RB</b> <b>allocation</b> Full RB ¹ shall be used per the single carrie multiple CC Com th the highest NR E supports 4Rx, t	SCC RB allocation Full RB ¹ each SCS and c or Uplink RB allo binations in the B_PCC is tested he test shall be	Uplink Config CC Mod'n DFT-s-OFDM QPSK channel BW as specified in T cation for reference sensitivi CA Configuration with the sa	PCC RB allocation REFSENS ² Fable 7.3.2.4.1-2. ty according to table ame NRB_agg, only ennas ports

		D	efault Conditio	ons	
Test E	Environment as specified		Normal		
	ubclause 4.1				
Test F	requencies as specified	l in TS 38.508-1	NOTE 4		
[5] sub	oclause 4.3.1				
	CC Combination setting		Highest N _{RB_ag}	19	
	ied in Table 5.5A.3.1-1		NOTE 5		
	guration across bandwid	th combination			
	upported by the UE.		1		
Test S	SCS as specified in Tabl		Lowest		
	Devention		Test Parameter		
<b>T</b>		hk Configuration		Uplink Config	
Test	CC	PCC RB	SCC RB	CC	PCC RB
ID	Mod'n	allocation	allocation	Mod'n	allocation
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²
				channel BW as specified in 1	
NOTE		o the single carrie	r Uplink RB allo	cation for reference sensitivi	ty according to table
	7.3.2.4.1-3.				
NOTE				performed only with 4Rx ant	-
NOTE				7.3.2.5-2) is used in the test	
NOTE				vith exceptions defined in Ta	
NOTE				ed with Low range test frequ	
NOTE				CA Configuration with the sa	ame NRB_agg, only the
	combination with th	ie nignest NRB_F	CU is tested.		

#### Table 7.6A.3.1.4.1-2: Test configuration table for Inter-band CA

#### Table 7.6A.3.1.4.1-3: Test configuration table for Intra-band non-contiguous CA

		D	efault Conditio	ons	
Test E	Environment as specified	d in TS 38.508-	Normal		
	subclause 4.1				
	CC Combination setting		NOTE 1, NOT	E 3	
	fied in Table 5.5A.2-1 for				
	guration across bandwid	th combination			
sets s	supported by the UE.				
Test C	Channel Bandwidths as	specified in TS	Highest N _{RB_ac}	$_{ m gg}$ for PCC and SCC, NOTE $^{\prime}$	1
38.50	8-1 [5] subclause 4.3.1				
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest		
			Test Parameter	ſS	
	Downlin	nk Configuration		Uplink Config	uration
Test	CC	PCC RB	SCC RB	CC	PCC RB
ID	Mod'n	allocation	allocation	Mod'n	allocation
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1
NOTE	1: The specific config	uration of uplink a	and downlink are	e defined in Table 7.3A.1.4.1	-3.
NOTE	2: In a band where U	E supports 4Rx, t	he test shall be	performed only with 4Rx ante	ennas ports
	connected and 4R	REFSENS requ	irement (Table 7	7.3.2.5-2) is used in the test i	requirements.
NOTE	3: If the UE supports	multiple CC Com	binations in the	CA Configuration with the sa	me N _{RB_agg} , only the
	combination with th	he highest NRB_F	PCC is tested.	-	

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.6A.3.1.4.1-1, Table 7.6A.3.1.4.1-2 or Table 7.6A.3.1.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.3.1.4.3.

7.6A.3.1.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.3.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6A.3.1.4.1-1, 7.6A.3.1.4.1-2 or 7.6A.3.1.4.1-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6A.3.1.4.1-1, 7.6A.3.1.4.1-2 or 7.6A.3.1.4.1-3 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the CW signal generator for an interfering signal below the CA Band for intra-band CA, or below the SCC's operating band for inter-band CA according to table 7.6A.3.1.5.1-2, 7.6A.3.1.5.3-2 or 7.6A.3.1.5.3-4. The frequency step size is min( BW_{channel} / 2,5) MHz.
- If CW interferer falls in a gap between F_{DL_High(j)} and F_{DL_Low(j+1)} where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.
- For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.6A.3.1.5.3-2 and 7.6A.3.1.5.3-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.
- For inter-band CA combination listed in Table 7.6A.3.1.5.3-5, exceptions to the requirement specified in Table 7.6A.3.1.5.3-6 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.
- 7. Set the downlink signal level according to the table 7.6A.3.1.5.1-1, 7.6A.3.1.5.3-1 or 7.6A.3.1.5.3-3 for both carriers. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.3.1.5.1-1, 7.6A.3.1.5.3-1 or 7.6A.3.1.5.3-3 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA. Measure the average throughput of both carriers for a duration sufficient to achieve statistical significance according to Annex H.2A for intra-band CA.
- 9. Record the frequencies for which the throughput doesn't meet the requirements.
- 10. Repeat steps from 6 to 9, using an interfering signal above the CA Band for intra-band CA, or above the SCC's operating band for inter-band CA at step 6.
- 11. For Inter-band CA: Switch the SCell into PCell and repeat steps 1 to 10, except for operating bands without uplink band.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6A.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

#### 7.6A.3.1.5 Test requirement

#### 7.6A.3.1.5.1 Out-of-band blocking for Intra-band contiguous CA

Except for the spurious response frequencies recorded in step 9 of test procedure, the throughput measurement derived in the test procedure of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6A.3.1.5.1-1 and 7.6A.3.1.5.1-2.

The number of spurious response frequencies recorded in step 9 of test procedure shall not exceed  $\left[\max\left\{24,6 \cdot \left\lceil n \cdot N_{RB} / 6 \right\rceil\right\}/\min\left\{\left\lfloor n \cdot N_{RB} / 10 \right\rfloor,5\right\}\right]$  in each assigned frequency channel when measured using a

min( $[BW_{channel}/2]$ ,5) MHz step size. For these exceptions the requirements of clause 7.7A Spurious Response are applicable.

### Table 7.6A.3.1.5.1-1: Out-of-band blocking parameters for intra-band contiguous CA

RX parameter	Uni	CA bandwidth class				
	ts	В	С			
Power in	dB	REFSENS + CA bandwidth class specific value below				
transmission	m					
bandwidth	dB	9	9			
configuration						
NOTE 1: The transmi	NOTE 1: The transmitter shall be set to 4 dB below PCMAX_L, f, c at the minimum UL					
configuration	configuration specified in Table 7.3.2.3-3 with PCMAX_L,f,c defined in clause					
6.2.4.	-					

NR band	Parameter	Unit	Range1	Range 2	Range 3
	Pinterferer	dBm	-45	-30	-15
n41, n48⁵, n66, n71	Finterferer (CW)	MHz	-60 < f - F _{DL_low} < -15 or 15 < f - F _{DL_high} < 60	-85 < f – F _{DL_low} ≤ -60 or 60 ≤ f – F _{DL_high} < 85	$1 \le f \le F_{DL_low} - 85$ or $F_{DL_high} + 85 \le f$ $\le 12750$
n77, n78 (NOTE 3)	Finterferer (CW)	MHz	N/A	N/A	$\label{eq:main_state} \begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel_CA}) \\ or \\ F_{DL_high} + MAX(200,3^*BW_{Channel_CA}) \\ \leq f \leq 12750 \end{array}$
n79 (NOTE 4)	F _{interferer} (CW)	MHz	N/A	N/A	$1 \leq f \leq F_{DL_low} -$ $MAX(150,3^*BW_{Channel_CA})$ or $F_{DL_high} + MAX(150,3^*BW_{Channel_CA})$ $\leq f \leq 12750$
NOTE 2: NOTE 3:	BW _{Channel_CA} den The power level of F _{Interferer} < 4800 MH from the frequency requirement for Ra band edge.	otes the ag f the interfe Hz. For BV y offset of a ange 2 is n	ggregated channel bandv erer (P _{Interferer} ) for Range 3 V _{Channel_CA} > 15 MHz, the 3*BW _{Channel_CA} from the ot applicable and Range	vidth of the wanted signal 3 shall be modified to -20 e requirement for Range band edge. For BW _{Chann} 3 applies from the freque	dBm, for F _{Interferer} > 2700 MHz and 1 is not applicable and Range 2 applies _{el_CA} larger than 60 MHz, the ency offset of 3*BW _{Channel_CA} from the
	F _{Interferer} < 5750 Mł from the frequency	Hz. For BV y offset of a f the interfe	V _{Channel_CA} ≥ 40 MHz, the 3*BW _{Channel_CA} from the	e requirement for Range : band edge.	dBm, for F _{Interferer} > 3650 MHz and 2 is not applicable and Range 3 applies dBm for F _{Interferer} > 2700 MHz and
NOTE 6:	The test requireme	ent of conf	igurations for CA operatir 90 replacing Band n41.	ng band including Band n	41 also apply for the corresponding CA

#### 7.6A.3.1.5.1-2: Out of-band blocking for intra-band contiguous CA

7.6A.3.1.5.2 Out-of-band blocking for Intra-band non-contiguous CA

Except for the spurious response frequencies recorded in step 9 of test procedure, the throughput measurement derived in the test procedure of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6A.3.1.5.3-1 and 7.6A.3.1.5.3-2 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and Tables 7.6A.3.1.5.3-3 and 7.6A.3.1.5.3-4 for NR bands with  $F_{DL_low} \geq 3300$  MHz and  $F_{UL_low} \geq 3300$  MHz. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

The number of spurious response frequencies recorded in step 9 of test procedure shall not exceed  $\lfloor \max\{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil\}/\min\{\lfloor n \cdot N_{RB} / 10 \rfloor, 5\} \rfloor$  in each assigned frequency channel when measured using a

min( $[BW_{channel}/2]$ ,5) MHz step size. For these exceptions the requirements of clause 7.7A Spurious Response are applicable.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.6A.3.1.5.3 Out-of-band blocking for Inter-band CA

Except for the spurious response frequencies recorded in step 9 of test procedure, the throughput measurement derived in the test procedure of SCC shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6A.3.1.5.3-1 and 7.6A.3.1.5.3-2 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and Tables 7.6A.3.1.5.3-3 and 7.6A.3.1.5.3-4 for NR bands with  $F_{DL_low} \geq 3300$  MHz and  $F_{UL_low} \geq 3300$  MHz. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

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The number of spurious response frequencies recorded in step 9 of test procedure shall not exceed  $\lfloor \max\{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil\}/\min\{\lfloor n \cdot N_{RB} / 10 \rfloor 5\} \rfloor$  in each assigned frequency channel when measured using a  $\min(\lfloor BW_{channel} / 2 \rfloor, 5)$  MHz step size. For these exceptions the requirements of clause 7.7A Spurious Response are applicable.

Table 7.6A.3.1.5.3-1: Out-of-band blocking parameters for NR bands with F _{DL_high} < 2700 MHz and
F _{UL_high} < 2700 MHz

DV noromotor	Units	Channel bandwidth					
RX parameter	Units	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	
Power in	dBm	R	EFSENS + chan	nel bandwidth sp	pecific value belo	ow.	
transmission	dB	6	6	7	9	10	
bandwidth							
configuration							
RX parameter	Units		C	hannel bandwid	lth		
KA parameter	Units	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	
Power in	dBm	R	EFSENS + chan	nel bandwidth sp	pecific value belo	ow.	
transmission	dB	11	12	13	14	15	
bandwidth							
configuration							
RX parameter	Units	Channel bandwidth					
KA parameter	Units	90 MHz	100 MHz				
Power in	dBm	REFSENS	6 + channel				
transmission		bandwidth s	pecific value				
bandwidth		be	low				
configuration	dB	15.5	16				
			below P _{CMAX_L,f} , ned in clause 6.2	c at the minimum 2.4.	UL configuration	n specified in	

## Table 7.6A.3.1.5.3-2: Out of-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

NR band	Parameter	Unit	Range 1	Range 2	Range 3			
n1, n2, n3,	Pinterferer	dBm	-44	-30	-15			
n5, n7, n8,	Finterferer (CW)	MHz						
n12, n20,								
n25, n28,								
n34, n38,			-60 < f – F _{DL low} < -15	95 of End 60	$1 \le f \le F_{DL_{low}} - 85$			
n39, n40,			= -	-85 < f – F _{DL_low} ≤ -60 or	or			
n41, n48 ⁵ ,			or 15 < f – F _{DL_high} < 60	60 ≤ f – F _{DL_high} < 85	F _{DL_high} + 85 ≤ f			
n50, n51,			$13 < 1 - FDL_high < 00$	$00 \le 1 - PDL_high < 03$	≤ 12750			
n66, n70,								
n71, n74,								
n75, n76								
NOTE1:	The power level of the	ne interfere	er (PInterferer) for Range 3	shall be modified to -20 o	dBm for FInterferer >			
	6000 MHz.							
NOTE 2:	For band 51 the $F_{DL}$	high of ban	d 50 is applied as $F_{DL_hig}$	_h for band 51. For band 5	50, the F _{DL_low} of band			
	51 is applied as F _{DL_}							
				h for band 76. For band 7	75, the F _{DL_low} of band			
	6 is applied as $F_{DL_{low}}$ for band 75.							
		or UEs supporting both bands 38 and 41, the $F_{DL_{high}}$ and $F_{DL_{low}}$ of band 41 is applied as $F_{DL_{high}}$ and						
	$F_{DL_{low}}$ for band 38.							
				cording to the general rec				
				or Range 3 shall be moo	lified to -20 dBm for			
	FInterferer > 2700 MHz	and Finterf	_{erer} < 4800 MHz.					
NOTE 6:			· · · · · <b>-</b>	<b>.</b>				
			-	f band 70 is applied as F	_{DL_high} for band 25, and			
	the FDL_low of band 2	5 is applie	d as F _{DL_low} for band 70.					

RX parameter	Units		Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz	
Power in	dBm	R	EFSENS + chan	nel bandwidth s	pecific value belo	w	
transmission bandwidth configuration	dB	6	7	9	9	9	
RX parameter Units		Channel bandwidth					
-		60 MHz	80 MHz	90 MHz	100 MHz		
Power in	dBm	REFSENS	6 + channel band	width specific v	alue below		
transmission bandwidth configuration	dB	9	9	9	9		

## Table 7.6A.3.1.5.3-3: Out-of-band blocking parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

## Table 7.6A.3.1.5.3-4: Out of-band blocking for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz MHz

NR band	Parameter	Unit	Range1	Range 2	Range 3	
n77, n78	Pinterferer	dBm	-44	-30	-15	
(NOTE 3)	Finterferer (CW)	MHz	-60 < f – F _{DL_low} ≤ -3*BW _{Channel} or 3*BW _{Channel} ≤ f – F _{DL_high} < 60	-200 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 200	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} \\ + \\ MAX(200,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$	
n79 (NOTE 4)	Finterferer (CW)	MHz	N/A	-150 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 150	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(150,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} \\ + \\ MAX(150,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$	
NOTE 1: T	he power level of th	ne interfere	er (PInterferer) for Range 3	shall be modified to -20	dBm for F _{Interferer} >	
<ul> <li>NOTE 1: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm for F_{Interferer} &gt; 6000 MHz.</li> <li>NOTE 2: BW_{Channel} denotes the channel bandwidth of the wanted signal</li> <li>NOTE 3: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm, for F_{Interferer} &gt; 2700 MHz and F_{Interferer} &lt; 4800 MHz. For BW_{Channel} &gt; 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3*BW_{Channel} from the band edge. For BW_{Channel} larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from</li> </ul>						
th NOTE 4: T 3	he frequency offset he power level of th 650 MHz and F _{Interfi}	of 3*BW _{Ct} ne interfere _{erer} < 5750	nannel from the band edge er (P _{Interferer} ) for Range 3 MHz. For BW _{Channel} ≥ 40		dBm, for F _{Interferer} > or Range 2 is not	

If CW interferer falls in a gap between  $F_{DL_{High}(j)}$  and  $F_{DL_{Low}(j+1)}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.6A.3.1.5.3-2 and 7.6A.3.1.5.3-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

For inter-band CA combination listed in Table 7.6A.3.1.5.3-5, exceptions to the requirement specified in Table 7.6A.3.1.5.3-6 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

CA band combination	
CA_n8-n78	
CA_n8-n79	
CA_n28-n78	

#### Table 7.6A.3.1.5.3-5: CA band combination with exceptions allowed

#### Table 7.6A.3.1.5.3-6: Requirement for out-of-band blocking exceptions

Parameter	Unit	Level				
PInterferer (CW)	dBm	-441				
NOTE 1: The requirement a	NOTE 1: The requirement applies when $ f_{Interferer} \pm f_{UL}^{LB} - f_{DL}^{HB}  \le (BW_{UL}^{LB} + BW_{DL}^{HB})/2$ ,					
where $f_{UL}^{LB}$ and $f_{DL}^{HB}$ are the carrier frequencies for lower frequency band UL						
and higher frequency band DL, respectively. $BW_{UL}^{LB}$ and $BW_{DL}^{HB}$ are the						
channel bandwidths configured for lower frequency band UL carrier and						
higher frequency	v band DL carrier in MHz, res	spectively.				

### 7.6A.3.2 Out-of-band blocking for CA (3DL CA)

#### 7.6A.3.2.1 Test purpose

Out-of-band band blocking for CA is defined for an unwanted CW interfering signal falling more than 15 MHz or 3*BW_{Channel_CA} below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz or 3*BW_{Channel_CA} below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5A and sub-clause 7.6A.2 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6A.3.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 3DL CA.

7.6A.3.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.6A.3.0.

7.6A.3.2.4 Te
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7.6A.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.6A.3.2.4.1-1 or 7.6A.3.2.4.1-2. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

		C	Default Condition	s	
Test E	Environment as specified		Normal	-	
	ubclause 4.1				
	requencies as specified	d in TS 38.508-	Mid range		
	subclause 4.3.1				
Test C	CC Combination setting	(N _{RB_agg} ) as	Highest N _{RB_agg}		
	ied in Table 5.5A.3.1-1		NOTE 3		
	guration across bandwic	Ith combination			
	upported by the UE.				
Test S	SCS as specified in Tab	le 5.3.5-1	Lowest		
			Test Parameters		
	Downl	ink Configuratio	n	Uplink Configuration	
Test	CC	PCC RB	SCCs RB	CC	PCC RB
ID	Mod'n	allocation	allocation	Mod'n	allocation
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²
•				DFT-s-OFDM QPSK annel BW as specified in T	
NOTE	1: Full RB allocation	shall be used per	each SCS and ch		able 7.3.2.4.1-2.
NOTE NOTE	1: Full RB allocation s 2: REFSENS refers to Table 7.3.2.4.1-3.	shall be used per the single carrie	each SCS and ch er Uplink RB alloca	annel BW as specified in T ation for reference sensitivi	able 7.3.2.4.1-2. ty according to
NOTE	<ol> <li>Full RB allocation s</li> <li>REFSENS refers to Table 7.3.2.4.1-3.</li> <li>If the UE supports</li> </ol>	shall be used per o the single carrie multiple CC Com	each SCS and ch r Uplink RB alloca binations in the C	annel BW as specified in T ation for reference sensitivi A Configuration with the sa	able 7.3.2.4.1-2. ty according to
NOTE NOTE NOTE	<ol> <li>Full RB allocation s</li> <li>REFSENS refers to Table 7.3.2.4.1-3.</li> <li>If the UE supports the combination wi</li> </ol>	shall be used per o the single carrie multiple CC Com th the highest NR	each SCS and ch er Uplink RB alloca binations in the C B_PCC is tested.	annel BW as specified in T ation for reference sensitivi A Configuration with the sa	able 7.3.2.4.1-2. ty according to me NRB_agg, only
NOTE NOTE	<ol> <li>Full RB allocation s</li> <li>REFSENS refers to Table 7.3.2.4.1-3.</li> <li>If the UE supports the combination wi</li> <li>In a band where U</li> </ol>	shall be used per o the single carrie multiple CC Com th the highest NR E supports 4Rx, t	each SCS and ch or Uplink RB alloca binations in the C. B_PCC is tested. he test shall be pe	annel BW as specified in T ation for reference sensitivi A Configuration with the sa	able 7.3.2.4.1-2. ty according to me NRB_agg, only ennas ports

#### Table 7.6A.3.2.4.1-1: Test configuration table for Intra-band contiguous CA

		C	Default Conditio	ons	
	Test Environment as specified in TS 38.508-				
	ubclause 4.1				
	requencies as specified	l in TS 38.508-	Inter-band : NO		
1 [5] s	subclause 4.3.1			tiguous + Inter-band: NOTE	
				-contiguous + Inter-band: Ma	ax WGap for Intra-
				iguous NOTE 5	
	CC Combination setting		Highest NRB_ag	g	
	ied in Tables 5.5A.1-1,		NOTE 3		
	in clauses 5.5A.3.x for				
	guration across bandwid	th combination			
	upported by the UE.				
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest		
	1		Test Parameter	-	
		nk Configuration		Uplink Config	
Test	CC	PCC RB	SCCs RB	CC	PCC RB
ID	Mod'n	allocation	allocation	Mod'n	allocation
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²
				channel BW as specified in T	
NOTE		o the single carrie	er Uplink RB allo	cation for reference sensitivi	ty according to
	Table 7.3.2.4.1-3.				
NOTE				CA Configuration with the sa	me NRB_agg, only
	the combination wi				
NOTE				performed only with 4Rx ante	
				7.3.2.5-2) is used in the test i	
NOTE				vith exceptions defined in Tal	
	For NR band n28,	30MHz test chan	nel bandwidth is	tested with Low range test f	requencies.

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.

- 4. The DL and UL Reference Measurement Channels are set according to Table 7.6A.3.2.4.1-1 or Table 7.6A.3.2.4.1-2.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.3.2.4.3.

7.6A.3.2.4.2 Test procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.3.2.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6A.3.2.4.1-1 or 7.6A.3.2.4.1-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6A.3.2.4.1-1 or 7.6A.3.2.4.1-2 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- Set the parameters of the CW signal generator for an interfering signal below the CA Band for intra-band CA, or below each SCC's operating band for inter-band CA according to Table 7.6A.3.2.5.1-2, 7.6A.3.2.5.2-2 or 7.6A.3.2.5.2-4. The frequency step size is min(| BW_{channel}/2 |,5) MHz.

If CW interferer falls in a gap between  $F_{DL_{High}(j)}$  and  $F_{DL_{Low}(j+1)}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.6A.3.2.5.2-2 and 7.6A.3.2.5.2-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1. Use the highest  $\Delta R_{IB,c}$  among CA bands for  $P_{interferer}$  calculation.

For inter-band CA combination listed in Table 7.6A.3.2.5.2-5, exceptions to the requirement specified in Table 7.6A.3.2.5.2-6 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

- 7. Set the downlink signal level according to Table 7.6A.3.2.5.1-1, 7.6A.3.2.5.2-1 or 7.6A.3.2.5.2-3 for all carriers. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.3.2.5.1-1, 7.6A.3.2.5.2-1 or 7.6A.3.2.5.2-3 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCCs simultaneously for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA. Measure the average throughput of all carriers simultaneously for a duration sufficient to achieve statistical significance according to Annex H.2A for intraband CA.
- 9. Record the frequencies for which the throughput doesn't meet the requirements and for each frequency, the carriers for which the throughput was not met.

- 10. Repeat steps 6 to 8 for each recorded frequency-carrier pair, with exception of pairs for which  $\Delta R_{IB,c}$  is the same as  $\Delta R_{IB}$  used in Step 6. In Step 6 use only recorded frequencies for interferer placement and use  $\Delta R_{IB,c}$  relevant to recorded carrier for  $P_{interferer}$  calculation. Remove the frequency-carrier pairs that meet the throughput requirements from the record.
- 11. Repeat steps from 6 to 10, using an interfering signal above the CA Band for intra-band CA, or above each SCC's operating band for inter-band CA at step 6.
- 12. For Inter-band CA: Switch the SCell into PCell and repeat steps 1 to 11, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

7.6A.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6A.3.2.5 Test requirement

#### 7.6A.3.2.5.1 Out-of-band blocking for Intra-band contiguous CA

Except for the spurious response frequencies recorded in step 9 of test procedure, the throughput measurement derived in the test procedure of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6A.3.2.5.1-1 and 7.6A.3.2.5.1-2.

The number of spurious response frequencies recorded in step 9 of test procedure shall not exceed  $\lfloor \max\{24,6 \cdot \lceil n \cdot N_{RB} / 6\rceil\}/\min\{\lfloor n \cdot N_{RB} / 10 \rfloor,5\}\rfloor$  in each assigned frequency channel when measured using a

min( $\lfloor BW_{channel}/2 \rfloor$ 5) MHz step size. For these exceptions the requirements of clause 7.7A Spurious Response are applicable.

Table 7.6A.3.2.5.1-1: Out-of-band blocking parameters for intra-band contiguous CA

RX parameter	Uni	i CA bandwidth class					
	ts	D					
Power in	dB	REFSENS + CA bandw	idth class specific value below				
transmission	m						
bandwidth	dB	9					
configuration							
NOTE 1: The transm	NOTE 1: The transmitter shall be set to 4 dB below PCMAX_L,f,c at the minimum UL						
configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause							
6.2.4.							

NR band	Parameter	Unit	Range1	Range 2	Range 3
	Pinterferer	dBm	-45	-30	-15
n41, n48⁵, n66, n71	Finterferer (CW)	MHz	-60 < f - F _{DL_low} < -15 or 15 < f - F _{DL_high} < 60	-85 < f – F _{DL_low} ≤ -60 or 60 ≤ f – F _{DL_high} < 85	1 ≤ f ≤ F _{DL_low} – 85 or F _{DL_high} + 85 ≤ f ≤ 12750
n77, n78 (NOTE 3)	Finterferer (CW)	MHz	N/A	N/A	$\label{eq:main_state} \begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel_CA}) \\ or \\ F_{DL_high} + MAX(200,3^*BW_{Channel_CA}) \\ \leq f \leq 12750 \end{array}$
n79 (NOTE 4)	Finterferer (CW)	MHz	N/A	N/A	$1 \le f \le F_{DL_low} -$ $MAX(150,3^*BW_{Channel_CA})$ or $F_{DL_high} + MAX(150,3^*BW_{Channel_CA})$ $\le f \le 12750$
	BW _{Channel_CA} den The power level o F _{Interferer} < 4800 MI from the frequency	otes the ag f the interfe Hz. For BV / offset of	ggregated channel bandw erer (P _{Interferer} ) for Range V _{Channel_CA} > 15 MHz, the 3*BW _{Channel_CA} from the	vidth of the wanted signal 3 shall be modified to -20 e requirement for Range band edge. For BW _{Chann}	dBm for F _{Interferer} > 6000 MHz. dBm, for F _{Interferer} > 2700 MHz and 1 is not applicable and Range 2 applies el_CA larger than 60 MHz, the ency offset of 3*BW _{Channel_CA} from the
NOTE 4: NOTE 5:	The power level of F _{Interferer} < 5750 MI from the frequency	Hz. For BV y offset of f the interfe	V _{Channel_CA} ≥ 40 MHz, the 3*BW _{Channel_CA} from the	e requirement for Range 2 band edge.	dBm, for F _{Interferer} > 3650 MHz and 2 is not applicable and Range 3 applies dBm for F _{Interferer} > 2700 MHz and
NOTE 6:	The test requirement	ent of conf	igurations for CA operatin 90 replacing Band n41.	ng band including Band n	41 also apply for the corresponding CA

#### 7.6A.3.2.5.1-2: Out of-band blocking for intra-band contiguous CA

#### 7.6A.3.2.5.2 Out-of-band blocking for Inter-band CA

Except for the spurious response frequencies recorded in step 9 and step 10 of test procedure, the throughput measurement derived in the test procedure of SCCs shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6A.3.2.5.2-1 and 7.6A.3.2.5.2-2 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and Tables 7.6A.3.2.5.2-3 and 7.6A.3.2.5.2-4 for NR bands with  $F_{DL_low} \geq 3300$  MHz and  $F_{UL_low} \geq 3300$  MHz. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

The number of spurious response frequencies recorded in step 9 and step 10 of test procedure shall not exceed  $\lfloor \max\{24,6 \cdot \lceil n \cdot N_{RB} / 6\rceil\}/\min\{\lfloor n \cdot N_{RB} / 10 \rfloor 5\} \rfloor$  in each assigned frequency channel when measured using a  $\min(\lfloor BW_{channel} / 2 \rfloor, 5)$  MHz step size. For these exceptions the requirements of clause 7.7A Spurious Response are applicable.

DV noremeter	Units		C	hannel bandwid	lth		
RX parameter	Units	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	
Power in	dBm	R	EFSENS + char	nel bandwidth sp	pecific value belo	w	
transmission bandwidth configuration	dB	6	6	7	9	10	
<b>BV</b> parameter	Units		C	hannel bandwid	lth		
RX parameter	Units	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	
Power in	dBm	R	EFSENS + char	nel bandwidth sp	pecific value belo	w	
transmission bandwidth configuration	dB	11	12	13	14	15	
DV memory ster	Unite		C	Channel bandwidth			
RX parameter	Units	90 MHz	100 MHz				
Power in	dBm	REFSENS	6 + channel				
transmission		bandwidth s	pecific value				
bandwidth		be	low				
configuration	dB	15.5	16				
			below P _{CMAX_L,f} , ned in clause 6.2	₀at the minimum 2.4.	UL configuration	n specified in	

# Table 7.6A.3.2.5.2-1: Out-of-band blocking parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

# Table 7.6A.3.2.5.2-2: Out of-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

NR band	Parameter	Unit	Range 1	Range 2	Range 3			
n1, n2, n3,	Pinterferer	dBm	-44	-30	-15			
n5, n7, n8,	Finterferer (CW)	MHz						
n12, n20,								
n25, n28,								
n34, n38,			-60 < f – F _{DL_low} < -15	-85 < f – F _{DL low} ≤ -60	$1 \le f \le F_{DL_{low}} - 85$			
n39, n40,			-00 < 1 = 1 DL_10w < -13 Or	-00 < 1 − 1 DL_low = -00 or	or			
n41, n48⁵,			15 < f – F _{DL_high} < 60	$60 \le f - F_{DL_{high}} < 85$	F _{DL_high} + 85 ≤ f			
n50, n51,			$13 < 1 = 1$ DL_nigh < 00	$00 = 1 - 1 DL_nign < 00$	≤ 12750			
n66, n70,								
n71, n74,								
· · · · · ·	n75, n76							
		ne interfere	er (P _{Interferer} ) for Range 3	shall be modified to -20 of	dBm for F _{Interferer} >			
	5000 MHz.							
		•		h for band 51. For band 5	50, the $F_{DL_{low}}$ of band			
	51 is applied as F _{DL_low} for band 50.							
	E 3: For band 76 the F _{DL_high} of band 75 is applied as F _{DL_high} for band 76. For band 75, the F _{DL_low} of band							
	′6 is applied as F _{DL_low} for band 75. For UEs supporting both bands 38 and 41, the F _{DL_high} and F _{DL_low} of band 41 is applied as F _{DL_high} and							
		ooth band	s 38 and 41, the FDL_high	and FDL_low of band 41 is	applied as FDL_high and			
	$F_{DL_{low}}$ for band 38.				uning an entral office and in			
				cording to the general rec				
				for Range 3 shall be moo	annea to -20 aBm for			
	F _{Interferer} > 2700 MHz	and Finterf	erer < 4800 IVIHZ.					
NOTE 6:		- ا- مرما ماله	OF and ZO the F	(hand 70 is spalied as F	for board OF and			
				f band 70 is applied as F	DL_high for band 25, and			
1	ne F _{DL_low} of band 2	s is applie	d as $F_{DL_{low}}$ for band 70.					

RX parameter	Units	Channel bandwidth					
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz	
Power in	dBm	R	EFSENS + chan	nel bandwidth sp	pecific value belo	w	
transmission bandwidth configuration	dB	6	7	9	9	9	
RX parameter Units		Channel bandwidth					
-		60 MHz	80 MHz	90 MHz	100 MHz		
Power in	dBm	REFSENS	6 + channel band	width specific va	alue below		
transmission bandwidth configuration	dB	9	9	9	9		
	ansmitter sh	all be set to 4dB	below PCMAX L.f.	at the minimum	UL configuration	specified in	
		th PCMAX L,f,c defi			0	•	

## Table 7.6A.3.2.5.2-3: Out-of-band blocking parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

## Table 7.6A.3.2.5.2-4: Out of-band blocking for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz MHz

NR band	Parameter	Unit	Range1	Range 2	Range 3		
n77, n78	Pinterferer	dBm	-44	-30	-15		
(NOTE 3)	Finterferer (CW)	MHz	-60 < f – F _{DL_low} ≤ -3*BW _{Channel} or 3*BW _{Channel} ≤ f – F _{DL_high} < 60	-200 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 200	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} + \\ MAX(200,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$		
n79 (NOTE 4)	Finterferer (CW)	MHz	N/A	-150 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 150	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(150,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} + \\ MAX(150,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$		
		ne interfere	er (P _{Interferer} ) for Range 3	shall be modified to -20	dBm for F _{Interferer} >		
NOTE 2: B NOTE 3: T 2 a B tt	<ul> <li>6000 MHz.</li> <li>FE 2: BW_{Channel} denotes the channel bandwidth of the wanted signal</li> <li>FE 3: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm, for F_{Interferer} &gt; 2700 MHz and F_{Interferer} &lt; 4800 MHz. For BW_{Channel} &gt; 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3*BW_{Channel} from the band edge. For BW_{Channel} larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3*BW_{Channel} from the band edge.</li> </ul>						
3	650 MHz and FInterf	_{erer} < 5750	MHz. For BW _{Channel} ≥ 40	shall be modified to -20 ( ) MHz, the requirement f set of 3*BW _{Channel} from th	or Range 2 is not		

If CW interferer falls in a gap between  $F_{DL_High(j)}$  and  $F_{DL_Low(j+1)}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

For the UE which supports inter-band CA configuration in Table 7.3A.3.5.1.3-5,  $P_{interferer}$  power defined in Table 7.6A.3.2.5.2-2 and 7.6A.3.2.5.2-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.3.5.1.3-1.

For inter-band CA combination listed in Table 7.6A.3.2.5.2-5, exceptions to the requirement specified in Table 7.6A.3.2.5.2-6 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

CA band combination	
CA_n8-n78	
CA_n8-n79	
CA_n28-n78	

#### Table 7.6A.3.2.5.2-5: CA band combination with exceptions allowed

#### Table 7.6A.3.2.5.2-6: Requirement for out-of-band blocking exceptions

Parameter	Unit	Level
PInterferer (CW)	dBm	-441
NOTE 1: The requirement applies when $ f_{Interferer} \pm f_{UL}^{LB} - f_{DL}^{HB}  \le (BW_{UL}^{LB} + BW_{DL}^{HB})/2$ ,		
where $f_{UL}^{LB}$ and $f_{DL}^{HB}$ are the carrier frequencies for lower frequency band UL		
and higher frequency band DL, respectively. $BW_{UL}^{LB}$ and $BW_{DL}^{HB}$ are the		
channel bandwidths configured for lower frequency band UL carrier and		
higher frequency band DL carrier in MHz, respectively.		

### 7.6A.3.3 Out-of-band blocking for CA (4DL CA)

#### 7.6A.3.3.1 Test purpose

Out-of-band band blocking for CA is defined for an unwanted CW interfering signal falling more than 15 MHz or 3*BW_{Channel_CA} below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz or 3*BW_{Channel_CA} below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5A and sub-clause 7.6A.2 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6A.3.3.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 4DL CA.

7.6A.3.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.6A.3.0.

7.6A.3.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.6A.3.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

	Default Conditions					
Test E	Environment as speci	ified in TS	Normal			
	8-1 [5] subclause 4.1					
	Frequencies as speci		Inter-band : NOTE 5			
38.50	8-1 [5] subclause 4.3	3.1		s + Inter-band: NOTE 5		
				guous + Inter-band: MaxWG	ap for Intra-band	
			non-contiguous (NO			
				guous + Intra-band non-cont	iguous: MaxWGap	
			for Intra-band non-co	ontiguous (NOTE 5)		
	CC Combination setti					
	ecified in Tables 5.5A		NOTE 3			
	ables in clauses 5.54					
	onfiguration across b ination sets supporte					
	SCS as specified in T		Lowest			
1651 3		able 5.5.5-1	Test Parameters			
	Dov	vnlink Configu		Uplink Config	uration	
Test	CC	PCC RB	SCCs RB	CC	PCC RB	
ID	Mod'n	allocation	allocation	Mod'n	allocation	
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²	
NOTE	1: Full RB allocation	on shall be used	per each SCS and ch	annel BW as specified in Ta	ble 7.3.2.4.1-2.	
NOTE	2: REFSENS refer	rs to the single o	arrier Uplink RB alloca	ation for reference sensitivity	according to	
	Table 7.3.2.4.1-3.					
NOTE	NOTE 3: If the UE supports multiple CC Combinations in the CA Configuration with the same NRB_agg, only					
	the combination with the highest NRB_PCC is tested.					
NOTE	NOTE 4: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.					
NOTE						
NOTE				h exceptions defined in Tabl		
	For NR band n2	28, 30MHz test o	channel bandwidth is te	ested with Low range test fre	equencies.	

#### Table 7.6A.3.3.4.1-1: Test configuration table for Inter-band CA

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.6A.3.3.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.3.3.4.3.

7.6A.3.3.4.2 Test procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.3.3.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6A.3.3.4.1-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6A.3.3.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

- 1450
- Set the parameters of the CW signal generator for an interfering signal below each SCC's operating band for inter-band CA according to Table 7.6A.3.3.5.1-2 or 7.6A.3.3.5.1-4. The frequency step size is min(| BW_{channel}/2 |,5) MHz.
- If CW interferer falls in a gap between  $F_{DL_High(j)}$  and  $F_{DL_Low(j+1)}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.
- For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.6A.3.3.5.1-2 and 7.6A.3.3.5.1-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1. Use the highest  $\Delta R_{IB,c}$  among CA bands for  $P_{interferer}$  calculation.
- For inter-band CA combination listed in Table 7.6A.3.3.5.1-5, exceptions to the requirement specified in Table 7.6A.3.3.5.1-6 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.
- 7. Set the downlink signal level according to the Table 7.6A.3.3.5.1-1, or 7.6A.3.3.5.1-3 for all carriers. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.3.3.5.1-1, or 7.6A.3.3.5.1-3 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCCs simultaneously for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA.
- 9. Record the frequencies for which the throughput doesn't meet the requirements and for each frequency, the carriers for which the throughput was not met.
- 10. Repeat steps 6 to 8 for each recorded frequency-carrier pair, with exception of pairs for which  $\Delta R_{IB,c}$  is the same as  $\Delta R_{IB}$  used in Step 6. In Step 6 use only recorded frequencies for interferer placement and use  $\Delta R_{IB,c}$  relevant to recorded carrier for P_{interferer} calculation. Remove the frequency-carrier pairs that meet the throughput requirements from the record.
- 11. Repeat steps from 6 to 10, using an interfering signal above each SCC's operating band for inter-band CA at step 6.
- 12. For Inter-band CA: Switch the SCell into PCell and repeat steps 1 to 11, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6A.3.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6A.3.3.5 Test requirement

#### 7.6A.3.3.5.1 Out-of-band blocking for Inter-band CA

Except for the spurious response frequencies recorded in step 9 and step 10 of test procedure, the throughput measurement derived in the test procedure of SCCs shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern

OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6A.3.3.5.1-1 and 7.6A.3.3.5.1-2 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and Tables 7.6A.3.3.5.1-3 and 7.6A.3.3.5.1-4 for NR bands with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

The number of spurious response frequencies recorded in step 9 and step 10 of test procedure shall not exceed  $\lfloor \max\{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil\}/\min\{\lfloor n \cdot N_{RB} / 10 \rfloor, 5\}\rfloor$  in each assigned frequency channel when measured using a  $\min(\lfloor BW_{channel} / 2 \rfloor, 5)$  MHz step size. For these exceptions the requirements of clause 7.7A Spurious Response are applicable.

Table 7.6A.3.3.5.1-1: Out-of-band blocking parameters for NR bands with F _{DL_high} < 2700 MHz and
F _{UL_high} < 2700 MHz

<b>BV</b> parameter	Units		C	hannel bandwid	th			
RX parameter	Units	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz		
Power in	dBm	R	EFSENS + chan	nel bandwidth sp	el bandwidth specific value below			
transmission bandwidth	dB	6	6	7	9	10		
configuration								
RX parameter	Units		C	hannel bandwid	th			
KA parameter	Units	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz		
Power in	dBm	R	REFSENS + channel bandwidth specific value below					
transmission bandwidth configuration	dB	11	12	13	14	15		
DV neverseter	L lusite	Channel bandwidth						
RX parameter	Units	90 MHz	100 MHz					
Power in	dBm	REFSENS	+ channel					
transmission		bandwidth s	pecific value					
bandwidth		bel	low					
configuration	dB	15.5	16					
NOTE: The transmitter shall be set to 4dB below $P_{CMAX_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2.3-3 with $P_{CMAX_L,f,c}$ defined in clause 6.2.4.								

# Table 7.6A.3.3.5.1-2: Out of-band blocking for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

NR band	Parameter	Unit	Range 1	Range 2	Range 3		
n1, n2, n3,	Pinterferer	dBm	-44	-30	-15		
n5, n7, n8,	Finterferer (CW)	MHz					
n12, n20,							
n25, n28,							
n34, n38,			$-60 < f - F_{DL low} < -15$	-85 < f – F _{DL low} ≤ -60	$1 \le f \le F_{DL_{low}} - 85$		
n39, n40,			Or	Or	or		
n41, n50,			$15 < f - F_{DL_{high}} < 60$	$60 \le f - F_{DL_{high}} < 85$	$F_{DL_high} + 85 \le f$		
n51, n66,				ee i be_nigh vee	≤ 12750		
n70, n71,							
n74, n75,							
n76							
	6000 MHz.	ne interfere	er (P _{Interferer} ) for Range 3	shall be modified to -20 (	DBM TOF FInterferer >		
		high of ban	d 50 is applied as FDL hig	b for band 51. For band 5	0 the Epillow of band		
	51 is applied as F _{DL}						
			d 75 is applied as FDL_hig	h for band 76. For band 7	75, the F _{DL low} of band		
	76 is applied as FDL	-			· _		
NOTE 4:	For UEs supporting	both band	s 38 and 41, the FDL_high a	and FDL_low of band 41 is	applied as FDL_high and		
	F _{DL low} for band 38.						
NOTE 6:							
NOTE 7:	7: For UE supporting both bands 25 and 70, the FDL_high of band 70 is applied as FDL_high for band 25, and						
	the F _{DL_low} of band 2	5 is applie	d as F _{DL_low} for band 70.				

RX parameter Units			Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz	
Power in	dBm	R	EFSENS + chan	nel bandwidth s	pecific value belo	W	
transmission bandwidth configuration	dB	6	7	9	9	9	
RX parameter	Units	Channel bandwidth					
-		60 MHz	80 MHz	90 MHz	100 MHz		
Power in	dBm	REFSENS + channel bandwidth specific value below					
transmission bandwidth configuration	dB	9	9	9	9		
NOTE: The transmitter shall be set to 4dB below P _{CMAX L,f,c} at the minimum UL configuration specified in							
Table 7.3.2.3-3 with $P_{CMAX}$ L.f.c defined in clause 6.2.4.							

# Table 7.6A.3.3.5.1-3: Out-of-band blocking parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

# Table 7.6A.3.3.5.1-4: Out of-band blocking for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz

NR band	Parameter	Unit	Range1	Range 2	Range 3	
n77, n78	Pinterferer	dBm	-44	-30	-15	
(NOTE 3)	Finterferer (CW)	MHz	-60 < f – F _{DL_low} ≤ -3*BW _{Channel} or 3*BW _{Channel} ≤ f – F _{DL_high} < 60	-200 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 200	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} \\ + \\ MAX(200,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$	
n79 (NOTE 4)	Finterferer (CW)	MHz	N/A	-150 < f – F _{DL_low} ≤ - MAX(60,3*BW _{Channel} ) or MAX(60,3*BW _{Channel} ) ≤ f – F _{DL_high} < 150	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(150,3^*BW_{Channel} \\ ) \\ or \\ F_{DL_high} \\ + \\ MAX(150,3^*BW_{Channel} \\ ) \\ \leq f \leq 12750 \end{array}$	
		ne interfere	er (PInterferer) for Range 3	shall be modified to -20	dBm for F _{Interferer} >	
<ul> <li>6000 MHz.</li> <li>NOTE 2: BW_{Channel} denotes the channel bandwidth of the wanted signal</li> <li>NOTE 3: The power level of the interferer (P_{Interferer}) for Range 3 shall be modified to -20 dBm, for F_{Interferer} &gt; 2700 MHz and F_{Interferer} &lt; 4800 MHz. For BW_{Channel} &gt; 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3*BW_{Channel} from the band edge. For BW_{Channel} larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from</li> </ul>						
NOTE 4: T 3	he power level of the former o	ne interfere _{erer} < 5750	MHz. For BW _{Channel} ≥ 40	shall be modified to -20 MHz, the requirement f set of 3*BW _{Channel} from th	or Range 2 is not	

If CW interferer falls in a gap between  $F_{DL_{High(j)}}$  and  $F_{DL_{Low(j+1)}}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

For the UE which supports inter-band CA configuration in Table 7.3A.3.5.1.3-5,  $P_{interferer}$  power defined in Table 7.6A.3.3.5.1-2 and 7.6A.3.3.5.1-4 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.3.5.1.3-1.

For inter-band CA combination listed in Table 7.6A.3.3.5.1-5, exceptions to the requirement specified in Table 7.6A.3.3.5.1-6 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier.

CA band combination	
CA_n8-n78	
CA_n8-n79	
CA_n28-n78	

#### Table 7.6A.3.3.5.1-5: CA band combination with exceptions allowed

#### Table 7.6A.3.3.5.1-6: Requirement for out-of-band blocking exceptions

Parameter	Unit	Level
PInterferer (CW)	dBm	-441
where $f_{UL}^{LB}$ and $f$ and higher frequ channel bandwid		uency band UL carrier and

# 7.6A.4 Narrow band blocking for CA

#### 7.6A.4.0 Minimum conformance requirements

#### 7.6A.4.0.1 Narrow band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggregation, the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.6A.4.0.1-1 with the uplink configuration. For UE(s) supporting one uplink, the uplink configuration of the PCC shall be in accordance with Table 7.3.2.3-3. The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.6A.4.0.1-1 being on either side of the aggregated signal. The throughput of each carrier shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6A.4.0.1-1.

NR	Deremeter	Unit	NR CA bandwidth class				
band	Parameter	Unit	В	С			
- 11	P _w in Transmission Bandwidth	dBm	REFSENS + NA CA Bandwidth Class specific value below	REFSENS + NA CA Bandwidth Class specific value below			
n41,	Configuration, per CC		16	16			
n66, n48,	Puw (CW)	dBm	-55	-55			
n71	$F_{uw}$ (offset for $\Delta f = 15$		- F _{offset} – 0.2	- F _{offset} – 0.2			
	kHz, 30 kHz)	MHz	/ + F _{offset} + 0.2	/ + F _{offset} + 0.2			
NOTE	1: The transmitter shall t 7.3.2.3-3 with P _{CMAX_L}		dB below $P_{CMAX_{L,f,c}}$ at the minimum d in clause 6.2.4.	UL configuration specified in Table			
NOTE	2: Reference measurem	ent chan	nel is specified in Annexes A.3.2 and cribed in Annex A.5.1.1/A.5.2.1.	A3.2 with one sided dynamic OCNG			
NOTE	NOTE 3: The PREFSENS power level is specified in Table 7.3.2.3-1 and Table 7.3.2.3-2 for two and four antenna ports, respectively.						
NOTE	NOTE 4: The $F_{uw}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $ F_{merferer}/0.015+0.5 0.015+0.0075$ MHz to be offset from the sub-carrier raster.						

Table 7.6A.4.0.1-1: Narrow-band blocking for intra-band contiguous CA

#### 7.6A.4.0.2 Narrow band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with FDL_low < 2700 MHz and FUL_low < 2700 MHz with one uplink carrier and two or more downlink sub-blocks, the narrow band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.0.2.2-1. For this uplink configuration, the UE shall meet the requirements

for each sub-block as specified in subclauses 7.6.4 and 7.6A.4.0.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

#### 7.6A.4.0.3 Narrow band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the narrow band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.6.4 for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{UW}$  power defined in Table 7.6.4.3-1 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6A.4.

#### 7.6A.4.1 Narrow band blocking for CA (2DL CA)

#### 7.6A.4,1.1 Test purpose

Verifies a receiver's ability to receive an NR signal at its assigned CA channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6A.4.1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 2DL CA.

7.6A.4.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.6A.4.0.

7.6A.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.6A.4.1.4.1-1, 7.6A.4.1.4.1-2 or 7.6A.4.1.4.1-3. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

	Default Conditions						
Test E	Environment as specified		Normal				
1 [5] s	subclause 4.1						
	requencies as specified	l in TS 38.508-1	Mid range				
	bclause 4.3.1						
	CC Combination setting		Highest N _{RB_ag}	99			
	ied in Table 5.5A.1-1 fo		NOTE 3				
	guration across bandwid	th combination					
sets s	upported by the UE.						
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest				
			Test Parameter	rs			
	Downlin	nk Configuration	l	Uplink Configuration			
Test	CC	PCC RB	SCC RB	CC	PCC RB		
ID	Mod'n	allocation	allocation	Mod'n	allocation		
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²		
NOTE	1: Full RB allocation s	shall be used per	each SCS and o	channel BW as specified in T	Table 7.3.2.4.1-2.		
NOTE	2: REFSENS refers to	o the single carrie	r Uplink RB allo	cation for reference sensitivi	ty according to		
	Table 7.3.2.4.1-3.						
NOTE	NOTE 3: If the UE supports multiple CC Combinations in the CA Configuration with the same NRB_agg, only						
	the combination with the highest NRB_PCC is tested.						
NOTE	4: In a band where U	E supports 4Rx, t	he test shall be	performed only with 4Rx ant	ennas ports		
	connected and 4R	REFSENS requ	irement (Table 7	7.3.2.5-2) is used in the test	requirements.		

#### Table 7.6A.4.1.4.1-1: Test configuration table for Intra-band contiguous CA

#### Table 7.6A.4.1.4.1-2: Test configuration table for Inter-band CA

	Default Conditions					
Test Environment as specified in TS 38.508-			Normal			
	ubclause 4.1					
Test F	requencies as specified	l in TS 38.508-1	NOTE 4			
[5] sub	oclause 4.3.1					
Test C	C Combination setting	(N _{RB_agg} ) as	Highest NRB_ag	19		
specifi	ied in Table 5.5A.3.1-1	for the CA	NOTE 5			
Config	juration across bandwid	th combination				
	upported by the UE.					
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest			
			Test Parameter	rs		
	Downlir	nk Configuration		Uplink Config	guration	
Test	CC	PCC RB	SCC RB	CC	PCC RB	
ID	Mod'n	allocation	allocation	Mod'n	allocation	
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²	
NOTE	1: Full RB allocation s	shall be used per	each SCS and o	channel BW as specified in 1	Table 7.3.2.4.1-2.	
NOTE	2: REFSENS refers to	o the single carrie	r Uplink RB allo	cation for reference sensitivi	ty according to	
	Table 7.3.2.4.1-3.					
NOTE				performed only with 4Rx ant		
	connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.					
NOTE	NOTE 4: Test frequency is set to Mid Range PCC and SCC with exceptions defined in Table 7.3A.2.4.1-1.					
				tested with Low range test f		
NOTE	5: If the UE supports	multiple CC Coml	binations in the	CA Configuration with the sa	ame $N_{RB_{agg}}$ , only the	
	combination with th	ne highest NRB_F	PCC is tested.			

		D	efault Conditio	ons				
Test E	Environment as specified	d in TS 38.508-	Normal					
1 [5] s	subclause 4.1							
Test F	requencies as specified	l in TS 38.508-1	NOTE 1					
[5] sub	bclause 4.3.1							
	CC Combination setting	(N _{RB agg} ) as	Highest N _{RB_ag}	Iq				
	ied in Table 5.5A.2-1 fo		NOTE 1, NOT					
•	guration across bandwid		,					
sets s	upported by the UE.							
Test S	SCS as specified in Tabl	e 5.3.5-1	Lowest					
	•		Test Parameter	rs				
	Downlir	nk Configuration	Uplink Configuration					
Test	CC	PCC RB	SCC RB	CC	PCC RB			
ID	Mod'n	allocation	allocation	Mod'n	allocation			
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1			
NOTE	1: The specific config	uration of uplink a	and downlink are	e defined in Table 7.3A.1.4.1	-3.			
NOTE	2: In a band where U	E supports 4Rx, t	he test shall be	performed only with 4Rx ante	ennas ports			
				.3.2.5-2) is used in the test i				
NOTE				CA Configuration with the sa	me N _{RB_agg} , only the			
	combination with th	he highest NRB_F	PCC is tested.					

#### Table 7.6A.4.1.4.1-3: Test configuration table for Intra-band non-contiguous CA

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.6A.4.1.4.1-1, Table 7.6A.4.1.4.1-2 or Table 7.6A.4.1.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.4.1.4.3.

#### 7.6A.4.1.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.4.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6A.4.1.4.1-1, 7.6A.4.1.4.1-2 or 7.6A.4.1.4.1-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6A.4.1.4.1-1, 7.6A.4.1.4.1-2 or 7.6A.4.1.4.1-3 on PCC. Since the UE has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the CW signal generator for an interfering signal below the CA Band for intra-band CA, or below the SCC's operating band for inter-band CA according to Table 7.6A.4.1.5.1-1 or 7.6A.4.1.5.3-1. For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1, P_{UW} power defined in Table 7.6A.4.1.5.3-1 is increased by the amount given by ΔR_{IB,c} in Table 7.3A.0.3.2.1-1.

- 7. Set the downlink signal level for both carriers according to 7.6A.4.1.5.1-1 or 7.6A.1.4.5.3-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.4.1.5.1-1 or 7.6A.1.4.5.3-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA. Measure the average throughput of both carriers for a duration sufficient to achieve statistical significance according to Annex H.2A for intra-band CA.
- 9. Repeat steps from 6 to 8, using an interfering signal above the CA Band for intra-band CA, and between PCC's and SCC's wanted signal for intra-band non-contiguous CA, or above the SCC's operating band for inter-band CA at step 6.
- 10. For Inter-band CA: Switch the SCell into PCell and repeat steps 1 to 9, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.
- 7.6A.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

- 7.6A.4.1.5 Test requirement
- 7.6A.4.1.5.1 Narrow band blocking for Intra-band contiguous CA

The throughput of each carrier shall be  $\ge 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6A.4.1.5.1-1.

NR	Parameter	Unit	NR CA bandwidth class							
band	Falailletei	Unit	В	С						
	P _w in Transmission		REFSENS + NA CA Bandwidth	REFSENS + NA CA Bandwidth Class						
	Bandwidth	dBm	Class specific value below	specific value below						
n41,	Configuration, per CC		16	16						
n48, n66,	Puw (CW)	dBm	-55	-55						
n71	$F_{uw}$ (offset for $\Delta f = 15$		- F _{offset} – 0.2	- F _{offset} – 0.2						
	kHz, 30 kHz)	MHz	/ + F _{offset} + 0.2	/ + F _{offset} + 0.2						

NOTE 1:	The transmitter shall be set a 4 dB below PCMAX_L,f,c at the minimum UL configuration specified in Table
	7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.
NOTE 2:	Reference measurement channel is specified in Annexes A.3.2 and A3.2 with one sided dynamic OCNG
	Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3:	The PREFSENS power level is specified in Table 7.3.2.3-1 and Table 7.3.2.3-2 for two and four antenna
	ports, respectively.
NOTE 4:	The F _{uw} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer
	and the centre frequency of the interferer and shall be further adjusted to
	$F_{\text{interferer}}/0.015+0.5$ $0.015+0.0075$ MHz to be offset from the sub-carrier raster.
NOTE 5:	The test requirement of configurations for CA operating band including Band n41 also apply for the
	corresponding CA operating bands with Band n90 replacing Band n41.

# 7.6A.4.1.5.2 Narrow band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with  $F_{DL_low} < 2700$  MHz and  $F_{UL_low} < 2700$  MHz with one uplink carrier and two downlink carriers, the narrow band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.0.2.2-1. The UE shall meet the requirements for each carrier as specified in subclause 7.6.4 for each component carrier respectively. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6A.4.1.5.3-1. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

### 7.6A.4.1.5.3 Narrow band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the narrow band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested, i.e. the requirements are tested only for the SCell downlink.

The throughput of each carrier, when operated as SCC, shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6A.4.1.5.3-1. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

NR	Para	Unit					С	hannel E	Bandwid	th				
band	meter		5	10	15	20	25	30	40	50	60	80	90	100M
			MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	Hz
n1,	Pw	dBm					s + chanı			cific valu	1			
n2,			16	13	14	16	16	16	16	16	16	16	16	16
n3, n5,	Puw (CW)	dBm	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
n7, n8, n12, n20, n25	F _{uw} (offset SCS= 15 kHz)	MHz	2.707 5	5.212 5	7.702 5	10.20 75	13.02 75	15.60 75	20.55 75	25.70 25	NA	NA	NA	NA
n28, n34, n38, n39, n40, n41, n48, n50, n51, n66, n70, n71, n74, n75, n76	Fuw (offset SCS= 30 kHz)	MHz	NA	NA	NA	NA	NA	NA	NA	NA	30.85 5	40.93 5	45.91 5	50.86 5
NOTE 1				e set a 4 ( use 6.2.4		PCMAX_L,	_{i,c} at the r	ninimum	UL config	guration s	specified	in Table	7.3.2.3-3	with
NOTE 2	2: Refere	ence me	asureme		el is spec		nnexes A	A.3.2 and	A.3.3 wit	h one sic	ded dynai	mic OCN	G Patterr	n OP.1

#### Table 7.6A.4.1.5.3-1: Narrow-band blocking

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{UW}$  power defined in Table 7.6A.4.1.5.3-1 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

### 7.6A.4.2 Narrow band blocking for CA (3DL CA)

#### 7.6A.4.2.1 Test purpose

Verifies a receiver's ability to receive an NR signal at its assigned CA channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6A.4.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 3DL CA.

7.6A.4.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.6A.4.0.

- 7.6A.4.2.4 Test description
- 7.6A.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.6A.4.2.4.1-1. The details of the uplink and

downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

	Default Conditions											
Test E	Environment as specified	d in TS 38.508-	Normal									
1 [5] s	ubclause 4.1											
Test F	requencies as specified	l in TS 38.508-1	Inter-band : No	OTE 5								
[5] sub	oclause 4.3.1		Intra-band con	itiguous + Inter-band: NOTE	5							
				-contiguous + Inter-band: M	axWGap for Intra-							
				iguous (NOTE 5)								
Test C	CC Combination setting	(N _{RB_agg} ) as	Highest NRB_ag	IG								
	ied in Tables 5.5A.1-1,		NOTE 3									
	in clauses 5.5A.3.x for											
	guration across bandwid	th combination										
	upported by the UE.											
Test S	SCS as specified in Tabl		Lowest									
			Test Parameter									
		nk Configuration	Uplink Configuration									
Test	CC	PCC RB	SCCs RB	CC	PCC RB							
ID	Mod'n	allocation	allocation	Mod'n	allocation							
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1							
		uration of uplink a	and downlink are	e defined in Table 7.3A.2.4.1	-1.							
	2: Void.											
NOTE				CA Configuration with the sa	ame NRB_agg, only							
	the combination wi											
NOTE				performed only with 4Rx ant								
				7.3.2.5-2) is used in the test								
NOTE		•		ith exceptions defined in Ta								
	For NR band n28,	30MHz test chanr	hel bandwidth is	tested with Low range test f	requencies.							

Table 7.6A.4.2.4.1-1: T	<b>Fest configuration</b>	table for 3DL CA

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.6A.4.2.4.1-1 or Table 7.6A.4.2.4.1-2.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.4.2.4.3.

7.6A.4.2.4.2 Test procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.4.2.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6A.4.2.4.1-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6A.4.2.4.1-1 on PCC. Since the UE has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the CW signal generator for an interfering signal below each SCC's operating band for inter-band CA according to Table 7.6A.4.2.5.1-1. For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{UW}$  power defined in Table 7.6A.4.2.5.1-1 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.
- 7. Set the downlink signal level for all carriers according to Table 7.6A.4.2.5.1-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.4.2.5.1-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCCs for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA.
- 9. Repeat steps from 6 to 8, using an interfering signal above each SCC's operating band for inter-band CA at step 6.
- 10. For Inter-band CA: Switch the SCell into PCell as per corresponding test IDs defined in Table 7.3A.2.4.1-1 and repeat steps 1 to 9, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6A.4.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6A.4.2.5 Test requirement

#### 7.6A.4.2.5.1 Narrow band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the narrow band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested, i.e. the requirements are tested only for the SCell downlink.

The throughput of each carrier, when operated as SCC, shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6A.4.2.5.1-1. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

NR	Para	Unit					С	hannel E	Bandwid	th				
band	meter		5	10	15	20	25	30	40	50	60	80	90	100M
			MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	Hz
n1,	Pw	dBm				PREFSEN	s + chanı	hel-band	width spe	cific valu	e below			
n2,			16	13	14	16	16	16	16	16	16	16	16	16
n3, n5,	P _{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
n7, n8, n12, n20, n25	F _{uw} (offset SCS= 15 kHz)	MHz	2.707 5	5.212 5	7.702 5	10.20 75	13.02 75	15.60 75	20.55 75	25.70 25	NA	NA	NA	NA
n28, n34, n38, n39, n40, n41, n48, n50, n51, n66, n70, n71, n74, n75, n76	Fuw (offset SCS= 30 kHz)	MHz	NA	NA	NA	NA	NA	NA	NA	NA	30.85 5	40.93 5	45.91 5	50.86 5
NOTE 1 NOTE 2	Р _{СМАХ.} 2: Refere	_L,f,c defir ence me	ned in cla asureme	e set a 4 d iuse 6.2.4 nt channe I in Anne:	1 el is spec	ified in A				-	-			

#### Table 7.6A.4.2.5.1-1: Narrow-band blocking

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For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{UW}$  power defined in Table 7.6A.4.2.5.1-1 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

### 7.6A.4.3 Narrow band blocking for CA (4DL CA)

#### 7.6A.4.3.1 Test purpose

Verifies a receiver's ability to receive an NR signal at its assigned CA channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6A.4.3.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 4DL CA.

7.6A.4.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.6A.4.0.

- 7.6A.4.3.4 Test description
- 7.6A.4.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.6A.4.3.4.1-1. The details of the uplink and

downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

		D	efault Conditio	ons				
Test E	Environment as specified	d in TS 38.508-	Normal					
1 [5] s	subclause 4.1							
Test F	requencies as specified	l in TS 38.508-1	Inter-band : No	OTE 5				
[5] sub	bclause 4.3.1		Intra-band con	tiguous + Inter-band: NOTE	5			
			Intra-band nor	-contiguous + Inter-band: M	axWGap for Intra-			
				iguous (NOTE 5)				
				-contiguous + Intra-band no	n-contiguous:			
				Intra-band non-contiguous (				
Test C	CC Combination setting	(N _{RB agg} ) as	Highest NRB_ag					
	ied in Tables 5.5A.1-1,		NOTE 3					
	in clauses 5.5A.3.x for							
Confic	guration across bandwid	th combination						
	upported by the UE.							
	SCS as specified in Tabl	e 5.3.5-1	Lowest					
	•		Test Parameter	ſS				
	Downlir	nk Configuration	Uplink Configuration					
Test	CC	PCC RB	SCCs RB	CC	PCC RB			
ID	Mod'n	allocation	allocation	Mod'n	allocation			
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1			
NOTE	1: The specific config	uration of uplink a	and downlink are	e defined in Table 7.3A.3.4.1	-1.			
NOTE	2: Void.							
NOTE	3: If the UE supports	multiple CC Com	binations in the	CA Configuration with the sa	me NRB_agg, only			
	the combination wi	th the highest NR	B_PCC is tested	d.				
NOTE				performed only with 4Rx ante				
				7.3.2.5-2) is used in the test				
NOTE				vith exceptions defined in Ta				
	For NR band n28,	30MHz test chann	<u>nel bandwidth is</u>	tested with Low range test f	requencies.			

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.6A.4.3.4.1-1 or Table 7.6A.4.3.4.1-2.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6A.4.3.4.3.

#### 7.6A.4.3.4.2 Test procedure

- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.4.3.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6A.4.3.4.1-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6A.4.3.4.1-1 on PCC. Since the UE has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the CW signal generator for an interfering signal below each SCC's operating band for inter-band CA according to Table 7.6A.4.3.5.1-1. For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{UW}$  power defined in Table 7.6A.4.3.5.1-1 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.
- 7. Set the downlink signal level for all carriers according to Table 7.6A.4.3.5.1-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.4.3.5.1-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCCs for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA.
- 9. Repeat steps from 6 to 8, using an interfering signal above each SCC's operating band for inter-band CA at step 6.
- 10. For Inter-band CA: Switch the SCell into PCell as per corresponding test IDs defined in Table 7.3A.3.4.1-1 and repeat steps 1 to 9, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6A.4.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6A.4.3.5 Test requirement

#### 7.6A.4.3.5.1 Narrow band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the narrow band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested, i.e. the requirements are tested only for the SCell downlink.

The throughput of each carrier, when operated as SCC, shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6A.4.3.5.1-1. The test requirement of configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41.

NR	Para	Unit					С	hannel E	Bandwid	h				
band	meter		5	10	15	20	25	30	40	50	60	80	90	100M
			MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	Hz
n1,	Pw	dBm				PREFSEN	s + chanı	nel-bandv	width spe	cific valu	e below			
n2,			16	13	14	16	16	16	16	16	16	16	16	16
n3, n5,	P _{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
n7, n8, n12, n20, n25	F _{uw} (offset SCS= 15 kHz)	MHz	2.707 5	5.212 5	7.702 5	10.20 75	13.02 75	15.60 75	20.55 75	NA	NA	NA	NA	NA
n28, n34, n38, n39, n40, n41, n50, n51, n66, n70, n71, n74, n75, n76	Fuw (offset SCS= 30 kHz)	MHz	NA	NA	NA	NA	NA	NA	NA	25.70 25	30.85 5	40.93 5	45.91 5	50.86 5
-	<ul> <li>NOTE 1: The transmitter shall be set a 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4</li> <li>NOTE 2: Reference measurement channel is specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.</li> </ul>													

#### Table 7.6A.4.3.5.1-1: Narrow-band blocking

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{UW}$  power defined in Table 7.6A.4.3.5.1-1 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

# 7.6B Blocking characteristics for NR-DC

For inter-band NR-DC configurations, the blocking characteristics for the corresponding inter-band CA configuration as specified in clause 7.6A applies.

Note: For NR-DC testing, replace CA by NR-DC, PCC by PCell, and SCC by PSCell in clause 7.6A.

# 7.6C Blocking characteristics for SUL

- 7.6C.1 General
- 7.6C.2 In-band blocking for SUL
- 7.6C.2.1 Test purpose

Same test purpose as in clause 7.6.2.1.

7.6C.2.2 Test applicability

This test applies to all types of NR UE release 15 and forward that support SUL operating on the SUL bands.

7.6C.2.3 Minimum conformance requirements

For SUL operation, the in-band blocking requirement for downlink bands specified in clause 7.6.2.3 shall be met.

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.6C.2.

#### 7.6C.2.4 Test description

Same test description as specified in clause 7.6.2.4 with following exceptions:

Instead of table 5.3.5-1  $\rightarrow$  use Table 5.5C-1

Instead of table 7.6.2.4.1-1  $\rightarrow$  use Table 7.6C.2.4-1.

	Default Conditions					
Test Environment as specified in TS 38.508-1 [5] subclause 4.1			Normal			
	uencies as sp		Mid range for bot	th SUL carrier and	Non-SUL carrier	
	[5] subclause					
		hs as specified i		hest for Non-SUL	carrier	
TS 38.50	8-1 [5] subcla	use 4.3.1	For SUL band:			
			n80: 30 MHz			
			n81: 20 MHz			
			n82: 20 MHz			
			n83: 20 MHz			
			n84: 20 MHz			
			n86: 40 MHz			
			n95: 15 MHz	n95: 15 MHz		
Test SCS	as specified i	n Table 5.3.5-1	15kHz for SUL c	15kHz for SUL carrier and lowest SCS for Non-SUL		
			carrier			
			Test Parameters			
Test ID	DL Con	figuration	UL Configuration	SUL Co	nfiguration	
	Mod'n	RB	N/A	Mod'n	RB allocation	
		allocation				
1	CP-OFDM	Full RB		DFT-s-OFDM	REFSENS (NOTE	
	QPSK	(NOTE 1)		QPSK	1)	
NOTE 1:	The specific	configuration of	SUL and DL are defir	ned in Table 7.3C.2	2.4.1-1.	
	NOTE 2: Test Channel Bandwidths are checked separately for each SUL band combination, the					
	applicable channel bandwidths are specified in Table 5.5C-1.					
NOTE 3:	NOTE 3: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1.					
NOTE 4: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas						
ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test						
	requirements			. ,		

- Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.8 for TE diagram and section A.3.2 for UE diagram.
- The parameter setting for the cell are set up according to the TS 38.508-1 [5] subclause 4.4.3.
- Downlink signals are initially setup according to Annex C.0, C.1, C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 with consideration of supplementary uplink physical channels.

Message contents in initial conditions are according to TS 38.508-1 [5] subclause 4.3.6.1.1.2 ensuring UL/SUL indicator in Table 4.3.6.1.1.2-1 with condition SUL, subclause 4.6 ensuring Tables 4.6.1-28 with condition SUL AND (RF OR RRM), 4.6.3-14 with condition SUL_SUL for SUL carrier, and Table 4.6.3-167 with condition PUSCH_PUCCH_ON_SUL, additionally the following exception shown in Table 7.6C.2.4-2 is considered.

#### Table 7.6C.2.4-2: PUSCH-Config

#### Derivation Path: TS 38.508-1 [5], Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED

#### Table 7.6C.2.4-3: Void

#### 7.6C.2.5 Test requirement

Same test requirement specified in clause 7.6.2.5 for downlink bands shall be met for in-band blocking testing for SUL.

# 7.6C.2_1 Inband Blocking for SUL with DL CA

# 7.6C.2_1.1 Inband Blocking for SUL with 2 DL CA

Editor's Note: No test points defined for Inband Blocking for SULwith inter-band 2 DL CA testing. The testing is covered by 7.6.2 and 7.6C.2.

#### 7.6C.2_1.1.1 Test purpose

Same test purpose as in clause 7.6A.2.1.

7.6C.2_1.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward that support SUL operating on the SUL bands and intraband contiguous 2DL CA.

#### 7.6C.2_1.1.3 Minimum conformance requirements

For SUL operation with downlink CA, the in-band blocking requirement for downlink bands specified in clause 7.6A.2.0 shall be met.

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.6C.2.

7.6C.2_1.1.4 Test description

7.6C.2_1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configuration specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each SUL configuration, are shown in Table 7.6C.2_1.1.4.1-1 for SUL with intra-band contiguous DL CA or Table 7.6C.2_1.1.4.1-2 for SUL with inter-band DL CA. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

#### Table 7.6C.2_1.1.4.1-1: Test configuration table for SUL configuration with Intra-band contiguous CA

Default Conditions						
Test Environment as specified in TS			Normal			
38.508-1 [5] subclause 4.1						
	requencies as spec		Mid range for	or both SUL carrie	r and Non-SUL carrie	r
	3-1 [5] subclause 4.3					
	hannel Bandwidths			3_agg for downlink b	ands	
	ed in TS 38.508-1 [	5]	For SUL ba	nd:		
subcla	use 4.3.1		n80: 30 MH	Z		
			n81: 20 MH	_		
			n82: 20 MH	=		
			n83: 20 MH	=		
			n84: 20 MH			
			n86: 40 MHz			
<b>T</b> ( 0			n95: 15 MHz			
Test SCS as specified in Table 5.3.5-		15kHz for SUL carrier and lowest for Non-SUL carrier				
Test Parameters						
Downlink Configurati			on	Uplink	SUL Conf	iguration
	Configuration					
Test	CC	PCC RB	SCC RB		CC	PCC RB
ID	Mod'n	allocation	allocation	N/A	Mod'n	allocation
1	CP-OFDM	NOTE 1	IOIE1   NOIE1   DELS-OFDN			NOTE 2
QPSK					QPSK	
NOTE 1: The specific downlink configuration is defined in Table 7.3A.1.4.1-1.						
NOTE 2: The specific SUL configuration is defined in Table 7.3C.2.4.1-1a. NOTE 3: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports						
NOTE						
connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.						

**For SUL configuration with inter-band DL CA:** No testing need to be performed since the testing has been covered in test case 7.6.2 and 7.6C.2. For band combination CA_nX_SUL_nY-nZ, test the inband blocking of SUL configuration or NR band as listed in Table 7.6C.2_1.1.4.1-2.

Table 7.6C.2_1.4	1.4.1-2: Test b	and combinations	and configuration
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Band configuration	Verifying in-band blocking of SUL configurations/ NR band	Subtest case	Table with test parameters to select
	SUL_n78-n80	7.6C.2	Table 7.6C.2.4-1
CA_n1A_SUL_n78A-n80A	n1	7.6.2	Table 7.6.2.4.1-1
CA_n1A_SUL_n78A-n84A	SUL_n78-n84	7.6C.2	Table 7.6C.2.4-1
CA_IIIA_SUL_II/8A-1164A	n1	7.6.2	Table 7.6.2.4.1-1
CA n3A SUL n78A-n80A	SUL_n78-n80	7.6C.2	Table 7.6C.2.4-1
CA_113A_30L_1176A-1160A	n3	7.6.2	Table 7.6.2.4.1-1
CA_n28A_SUL_n41A-	SUL_n41-n83	7.6C.2	Table 7.6C.2.4-1
n83A	n28	7.6.2	Table 7.6.2.4.1-1
CA_n28A_SUL_n79A-	SUL_n79A-n83A	7.6C.2	Table 7.6C.2.4-1
n83A	n28	7.6.2	Table 7.6.2.4.1-1

- Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.10 for TE diagram and section A.3.2 for UE diagram.
- The parameter setting for the cell are set up according to the TS 38.508-1 [5] subclause 4.4.3.
- Downlink signals are initially setup according to Annex C.0, C.1, C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 with consideration of supplementary uplink physical channels.

Message contents in initial conditions are according to TS 38.508-1 [5] subclause 4.3.6.1.1.2 ensuring UL/SUL indicator in Table 4.3.6.1.1.2-1 with condition SUL, subclause 4.6 ensuring Tables 4.6.1-28 with condition SUL AND (RF OR RRM), 4.6.3-14 with condition SUL_SUL for SUL carrier, and Table 4.6.3-167 with condition PUSCH_PUCCH_ON_SUL, additionally the following exception shown in Table7.6C.2_1.1.4.1-3 is considered.

#### Table 7.6C.2_1.1.4.1-3: PUSCH-Config

#### Derivation Path: TS 38.508-1 [5], Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED

#### 7.6C.2_1.1.4.2 Test procedure

For SUL configuration with intra-band contiguous DL CA:

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6C.2_1.1.4.1.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6C.2_1.1.4.1-1 on both SCC and PCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6C.2_1.1.4.1-1 on SUL. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Tables 7.6A.2.1.5.1-1 and 7.6A.2.1.5.1-2 or Tables 7.6A.2.1.5.1-1a and 7.6A.2.1.5.1-2a as appropriate depending on NR band.
- Set the downlink signal level on both carriers according to the Table 7.6A.2.1.5.1-1, 7.6A.2.1.5.1-1a or 7.6A.2.1.5.3-1, 7.6A.2.1.5.3-1a as appropriate. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.2.1.5.1-1, 7.6A.2.1.5.1-1a or 7.6A.2.1.5.3-1, 7.6A.2.1.5.3-1a for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of both carriers for a duration sufficient to achieve statistical significance according to Annex H.2A.
- 9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal in Case 1 at step 6.
- 10. Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth.
- 12. Repeat steps from 6 to 10, using interfering signals in Case 3 as applicable at step 6 and 9. The ranges of case 3 are covered in steps equal to the interferer bandwidth.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6C.2_1.1.5 Test requirement

Same test requirement specified in 7.6A.2.1.5.1 shall be met for downlink bands for SUL configuration with intra-band contiguous DL CA.

Same test requirement specified in clause 7.6C.2.5 or 7.6.2.5 for each band or band combinations listed in Table 7.6C.2_1.1.4.1-2 shall be met for inband blocking testing for SUL configuration with inter-band DL CA.

# 7.6C.3 Out-of-band blocking for SUL

#### 7.6C.3.1 Test Purpose

Same test purpose as in clause 7.6.3.1.

7.6C.3.2 Test applicability

This test applies to all types of NR UE release 15 and forward that support SUL operating on the SUL bands.

7.6C.3.3 Minimum conformance requirements

For SUL operation, the out-of-band blocking requirement for downlink bands specified in clause 7.6.3 shall be met. For operation band combination listed in Table 7.6C.3.3-1, exceptions to the requirement specified in Table 7.6C.3.3-2 are allowed when the second order intermodulation product of the SUL carrier and the CW interfering signal fully or partially overlaps with the DL carrier.

NR Band combination for SUL
SUL_n78-n81
SUL_n78-n82
SUL_n78-n83
SUL_n79-n81
SUL_n79-n83

#### Table 7.6C.3.3-2: Requirement for out-of-band blocking exceptions

Parameter	Unit	Level	
PInterferer (CW)	dBm	-44 ¹	
<b>NOTE 1</b> : The requirement applies when $ f_{Interferer} \pm f_{SUL} - f_{DL}  \le (BW_{SUL} + C)$			
$BW_{DL}$ )/2, where $BW_{SUL}$ and $BW_{DL}$ are the channel bandwidths configured for SUL and DL (victim) bands in MHz, respectively.			

For all interferer frequency ranges specified in clause 7.6.3 a maximum of

 $\left\lfloor \max\left\{24,6\cdot\left\lceil n\cdot N_{RB}/6\right\rceil\right\}/\min\left\{\left\lfloor n\cdot N_{RB}/10\right\rfloor,5\right\}\right\rfloor$ 

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(\lfloor CBW/2 \rfloor, 5)$  MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration, *CBW* the bandwidth of the frequency channel in MHz and n = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.6C.3.

7.6C.3.4 Test description

Same test description as specified in clause 7.6.3.4 with following exceptions:

Instead of table 5.3.5-1  $\rightarrow$  use Table 5.5C-1

Instead of table 7.6.3.4.1-1  $\rightarrow$  use Table 7.6C.3.4-1.

	Default Conditions					
Test Environment as specified in TS		Normal				
38.508-1 [5] subclause 4.1						
	luencies as sp		Mid range for SL	JL carrier		
38.508-1	[5] subclause	4.3.1		One frequency chosen arbitrarily from low or high range		
				for Non-SUL carrier		
		hs as specified i		Lowest, Mid, Highest for Non-SUL carrier		
TS 38.50	8-1 [5] subcla	use 4.3.1	For SUL band:			
			n80: 30 MHz			
			n81: 20 MHz			
			n82: 20 MHz			
			n83: 20 MHz			
			n84: 20 MHz			
			n95: 15 MHz	n86: 40 MHz		
Test SCS as specified in Table 5.3.5-1			15kHz for SUL carrier and lowest for Non-SUL carrier			
		Test Parameters				
Test ID	DL Con	figuration	UL Configuration	SUL Co	nfiguration	
	Mod'n	RB	N/A	Mod'n	RB allocation	
		allocation				
1	CP-OFDM	Full RB		DFT-s-OFDM	<b>REFSENS (NOTE</b>	
	QPSK	(NOTE 1)		QPSK	1) `	
NOTE 1:	The specific	configuration of	SUL and DL are defir	ned in Table 7.3C.2	2.4.1-1.	
NOTE 2:						
	applicable channel bandwidths are specified in Table 5.5C-1.					
	NOTE 3: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1.					
NOTE 4: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas						
ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test			s used in the test			
	requirements.					

#### Table 7.6C.3.4-1: Test Configuration Table

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- Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.9 for TE diagram and section A.3.2 for UE diagram.
- The parameter setting for the cell are set up according to the TS 38.508-1 [5] subclause 4.4.3.
- Downlink signals are initially setup according to Annex C.0, C.1, C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 with consideration of supplementary uplink physical channels.

Message contents in initial conditions are according to TS 38.508-1 [5] subclause 4.3.6.1.1.2 ensuring UL/SUL indicator in Table 4.3.6.1.1.2-1 with condition SUL, subclause 4.6 ensuring Tables 4.6.1-28 with condition SUL AND (RF OR RRM), 4.6.3-14 with condition SUL_SUL for SUL carrier, and Table 4.6.3-167 with condition PUSCH_PUCCH_ON_SUL, additionally the following exception shown in Table 7.6C.3.4-2 is considered.

#### Table 7.6C.3.4-2: PUSCH-Config

#### Derivation Path: TS 38.508-1 [5], Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED

#### Table 7.6C.3.4-3: Void

#### 7.6C.3.5 Test Requirement

For SUL operation, the out-of-band blocking requirement for downlink bands specified in clause 7.6.3.5 shall be met. For operation band combination listed in Table 7.6C.3.5-1, exceptions to the requirement specified in Table 7.6C.3.5-2 are allowed when the second order intermodulation product of the SUL carrier and the CW interfering signal fully or partially overlaps with the DL carrier.

NR Band combination for SUL
SUL_n78-n81
SUL_n78-n82
SUL_n78-n83
SUL_n79-n81
SUL_n79-n83

#### Table 7.6C.3.5-1: SUL operating band combination with exceptions allowed

Table 7.6C.3.5-2: Requirement fo	r out-of-band blocking exceptions
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Parameter	Unit	Level	
PInterferer (CW)	dBm	-44 ¹	
NOTE 1: The requirement	t applies when $ f_{Interferer} \pm  $	$ f_{SUL} - f_{DL}  \le (BW_{SUL} +$	
$BW_{DL}$ )/2, where $BW_{SUL}$ and $BW_{DL}$ are the channel bandwidths configured fo			
SUL and DL (vio	tim) bands in MHz, respectiv	vely.	

For all interferer frequency ranges, a maximum of

 $\left\lfloor \max\left\{24,6\cdot\left\lceil n\cdot N_{RB}/6\right\rceil\right\}/\min\left\{\left\lfloor n\cdot N_{RB}/10\right\rfloor,5\right\}\right\rfloor$ 

exceptions are allowed for the spurious response frequencies recorded in the final step of test procedure in each assigned frequency channel when measured using a step size of  $\min(\lfloor CBW/2 \rfloor 5)$  MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration, *CBW* the bandwidth of the frequency channel in MHz and n = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

# 7.6C.3_1 Out-of-band blocking for SUL with DL CA

### 7.6C.3_1.1 Out-of-band Blocking for SUL with 2 DL CA

Editor's Note: No test points defined for Out-of-band Blocking for SUL with inter-band 2 DL CA testing. The testing is covered by 7.6.3 and 7.6C.3

7.6C.3_1.1.1 Test purpose

Same test purpose as in clause 7.6.3.1.

#### 7.6C.3_1.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward that support SUL operating on the SUL bands and intraband contiguous 2DL CA.

7.6C.3_1.1.3 Minimum conformance requirements

For SUL operation with downlink CA, the out-of-band blocking requirement for downlink bands specified in clause 7.6A.3 shall be met. For operation band combination listed in Table 7.6C.3_1.1.3-1, exceptions to the requirement specified in Table 7.6C.3_1.1.3-2 are allowed when the second order intermodulation product of the SUL carrier and the CW interfering signal fully or partially overlaps with the DL carrier.

#### Table 7.6C.3_1.1.3-1: SUL operating band combination with exceptions allowed

NR Band combination for SUL
SUL_n78-n81
SUL_n78-n82
SUL_n78-n83
SUL_n79-n81
SUL_n79-n83

Parameter	Unit	Level				
PInterferer (CW)	dBm	-44 ¹				
NOTE 1: The requirement applies when $ f_{Interferer} \pm f_{SUL} - f_{DL}  \le (BW_{SUL} + C)$						
$BW_{DL}$ /2, where $BW_{SUL}$ and $BW_{DL}$ are the channel bandwidths configured for						
SUL and DL (victim) bands in MHz, respectively.						

Table7.6C.3_1.1.3-2: Requirement for out-of-band blocking exceptions

For all interferer frequency ranges specified in clause 7.6.3 a maximum of

 $\left\lfloor \max\left\{24,6\cdot\left\lceil n\cdot N_{RB} / 6\right\rceil\right\} / \min\left\{\left\lfloor n\cdot N_{RB} / 10\right\rfloor,5\right\}\right\rfloor$ 

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of min( $[BW_{channel}/2]$ ,5) MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration, BW_{Channel} the bandwidth of the frequency channel in MHz and n = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

The normative reference for this requirement is TS 38.101-1 [2] clauses 7.6C.3.

7.6C.3_1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.6C.3_1.1.4.1-1 for SUL with intra-band contiguous DL CA or Table 7.6C.3_1.1.4.1-2 for SUL with inter-band DL CA. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

#### Table 7.6C.3_1.1.4.1-1: Test configuration table for SUL configuration with Intra-band contiguous CA

Default Conditions								
Test Environment as specified in TS			Normal					
	8-1 [5] subclause 4.							
	requencies as spec			or SUL carrier				
38.508	8-1 [5] subclause 4.	3.1		ncy chosen arbitra	rily from low or high ra	ange for Non-SUL		
			carrier					
	Channel Bandwidths			_ _{agg} for downlink b	ands			
	ied in TS 38.508-1	5]	For SUL ba					
subcla	ause 4.3.1		n80: 30 MH					
			n81: 20 MH					
			n82: 20 MH					
			n83: 20 MH					
			n84: 20 MH	_				
			n86: 40 MHz n95: 15 MHz					
Toot S	SCS as specified in	Table 5 2 5	15kHz	2				
1	bub as specified in							
			Test F	Parameters				
	Downlin	k Configurati	on	Uplink	SUL Configuration			
				Configuration	••= ••	.g		
Test	CC	PCC RB	SCC RB		CC	PCC RB		
ID	Mod'n	allocation	allocation	N/A	Mod'n	allocation		
1	CP-OFDM	NOTE 1	NOTE 1	IN/A	DFT-s-OFDM	NOTE 2		
	QPSK QPSK							
NOTE 1: The specific downlink configuration is defined in Table 7.3A.1.4.1-1.								
NOTE 2:The specific SUL configuration is defined in Table 7.3C.2.4.1-1a.NOTE 3:In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports								
connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.								

**For SUL configuration with inter-band DL CA:** No testing need to be performed since the testing has been covered in test case 7.6.3 and 7.6C.3. For band combination CA_nX_SUL_nY-nZ, test the out-of-band blocking of SUL configuration or NR band as listed in Table 7.6C.3_1.1.4.1-2.

Table 7.6C.3	1.1.4.1-2:	Test band	combinations	and configuration
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Band configuration	Verifying out-of-band blocking of SUL configurations/ NR band	Subtest case	Table with test parameters to select
	SUL_n78-n80	7.6C.3	Table 7.6C.3.4-1
CA_n1A_SUL_n78A-n80A	n1	7.6.3	Table 7.6.3.4.1-1
CA_n1A_SUL_n78A-n84A	SUL_n78-n84	7.6C.3	Table 7.6C.3.4-1
	n1	7.6.3	Table 7.6.3.4.1-1
	SUL_n78-n80	7.6C.3	Table 7.6C.3.4-1
CA_n3A_SUL_n78A-n80A	n3	7.6.3	Table 7.6.3.4.1-1
CA_n28A_SUL_n41A-	SUL_n41-n83	7.6C.3	Table 7.6C.3.4-1
n83A	n28	7.6.3	Table 7.6.3.4.1-1
CA_n28A_SUL_n79A-	SUL_n79A-n83A	7.6C.3	Table 7.6C.3.4-1
n83A	n28	7.6.3	Table 7.6.3.4.1-1

- Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.10 for TE diagram and section A.3.2 for UE diagram.
- The parameter setting for the cell are set up according to the TS 38.508-1 [5] subclause 4.4.3.
- Downlink signals are initially setup according to Annex C.0, C.1, C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 with consideration of supplementary uplink physical channels.

Message contents in initial conditions are according to TS 38.508-1 [5] subclause 4.3.6.1.1.2 ensuring UL/SUL indicator in Table 4.3.6.1.1.2-1 with condition SUL, subclause 4.6 ensuring Tables 4.6.1-28 with condition SUL AND

(RF OR RRM), 4.6.3-14 with condition SUL_SUL for SUL carrier, and Table 4.6.3-167 with condition PUSCH_PUCCH_ON_SUL, additionally the following exception shown in Table 7.6C.3_1.1.4.1-3 is considered.

#### Table 7.6C.3_1.1.4.1-3: PUSCH-Config

#### Derivation Path: TS 38.508-1 [5], Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED

7.6C.3_1.1.4.2 Test procedure

For SUL configuration with intra-band contiguous DL CA:

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.6A.3.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6C.3_1.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6C.3_1.1.4.1-1 on SUL. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 6. Set the parameters of the CW signal generator for an interfering signal below the CA Band for intra-band CA, or below the SCC's operating band for inter-band CA according to Table 7.6A.3.1.5.1-2, 7.6A.3.1.5.3-2 or 7.6A.3.1.5.3-4. The frequency step size is min(| BW_{channel}/2 |,5) MHz.

If CW interferer falls in a gap between  $F_{DL_High(j)}$  and  $F_{DL_Low(j+1)}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

- 7. Set the downlink signal level according to the Table 7.6A.3.1.5.1-1, 7.6A.3.1.5.3-1 or 7.6A.3.1.5.3-3 for both carriers. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6A.3.1.5.1-1, 7.6A.3.1.5.3-1 or 7.6A.3.1.5.3-3 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of both carriers for a duration sufficient to achieve statistical significance according to Annex H.2A for intra-band CA.
- 9. Record the frequencies for which the throughput doesn't meet the requirements.

10. Repeat steps from 6 to 9, using an interfering signal above the CA Band for intra-band CA at step 6.

NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.6C.3_1.1.5 Test requirement

Same test requirement specified in 7.6A.3.1.5.1 shall be met for downlink bands for SUL configuration with intra-band contiguous DL CA with following exception:

NR Band combination for SUL				
SUL_n78-n81				
SUL_n78-n82				
SUL_n78-n83				
SUL_n79-n81				
SUL_n79-n83				

#### Table 7.6C.3_1.1.5-1: SUL operating band combination with exceptions allowed

Parameter	Unit	Level				
PInterferer (CW)	dBm	-44 ¹				
NOTE 1: The requirement applies when $ f_{Interferer} \pm f_{SUL} - f_{DL}  \le (BW_{SUL} + C)$						
$BW_{DL}$ /2, where $BW_{SUL}$ and $BW_{DL}$ are the channel bandwidths configured for						
SUL and DL (victim) bands in MHz, respectively.						

Same test requirement specified in clause 7.6C.3.5 or 7.6.3.5 for each band or band combinations listed in Table 7.6C.3_1.1.4-1 shall be met for out-of-band blocking testing for SUL configuration with inter-band 2DL CA.

# 7.6D Blocking characteristics for UL MIMO

# 7.6D.1 General

The blocking characteristic for UL MIMO is a measure of the receiver's ability of an UE that support UL MIMO to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in subclause 7.6 shall be met with the UL MIMO configurations described in sub-clause 6.2D.1. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

# 7.6D.2 In-band blocking for UL MIMO

#### 7.6D.2.1 Test purpose

In-band blocking for UL MIMO is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the receive band of an UE that support UL MIMO, with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, or into the range from 3CBW below to 3CBW above the receive band of an UE that support UL MIMO, with  $F_{DL_high} < 3300$  MHz and  $F_{UL_high} < 3300$  MHz, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other g-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6D.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

#### 7.6D.2.3 Minimum conformance requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in subclause 7.6 shall be met with the UL MIMO configurations described in sub-clause 6.2D.1. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6D.

#### 7.6D.2.4 Test description

7.6D.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.6D.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions					
Test Environment as specified in TS		Normal			
38.508-1 [5] subclause 4.1					
	encies as specified in T	S	Mid range		
38.508-1 [5	5] subclause 4.3.1				
Test Chan	nel Bandwidths as speci	fied in	Lowest, Mid,	Highest	
TS 38.508	-1 [5] subclause 4.3.1				
Test SCS a	Test SCS as specified in Table 5.3.5-1		Lowest		
	Test Parameters				
	Downlink Co	onfigura	ion Uplink Configuration		
Test ID	Mod'n	RB	allocation	Mod'n	<b>RB</b> allocation
1	CP-OFDM QPSK	1	NOTE 1	CP-OFDM QPSK	NOTE 1
NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3D.2.4.1-1.					
NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas					
ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test					
	requirements.				

- 1. Connect the SS and interfering source to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.4 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.6D.2.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.6D.2.4.3.

7.6D.2.4.2 Test procedure

Same test procedure as specified in 7.6.2.4.2.

7.6D.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO.

#### 7.6D.2.5 Test requirement

Same test requirement as specified in 7.6.2.5.

#### Table 7.6D.2.5-1: Void

# 7.6D.3 Out-of-band blocking for UL MIMO

#### 7.6D.3.1 Test purpose

Out-of-band blocking for UL MIMO is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the receive band of an UE that support UL MIMO, with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz, or falling more than 3CBW below or above the receive band of an UE that support UL MIMO, with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of out-of-band blocking ability will decrease the coverage area when other g-NodeB transmitters exist (except in the adjacent channels and spurious response).

#### 7.6D.3.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

#### 7.6D.3.3 Minimum conformance requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in subclause 7.6 shall be met with the UL MIMO configurations described in sub-clause 6.2D.1. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6D.

7.6D.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.6D.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions						
Test Environment as specified in TS 38.508-1 [5] subclause 4.1		Normal				
		_			<del> </del>	
	encies as specified in T	S	One frequence	chosen arbitrarily from	low or high range	
	5] subclause 4.3.1					
Test Chan	nel Bandwidths as speci	fied in	Lowest, Mid,	Highest		
TS 38.508	-1 [5] subclause 4.3.1					
Test SCS a	Test SCS as specified in Table 5.3.5-1		Lowest			
		Т	est Parameter	S		
	Downlink Co	onfigura	tion	Uplink Configuration		
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation	
1	CP-OFDM QPSK	1	NOTE 1 CP-OFDM QPSK NOTE 1			
NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3D.2.4.1-1.						
NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas						
ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test						
	requirements.					
L						

Table 7.6D.3.4.1-1: Test Configuration Table

1. Connect the SS and interfering source to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.5 for TE diagram and section A.3.2 for UE diagram.

- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.6D.3.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.6D.3.4.3.

7.6D.3.4.2 Test procedure

Same test procedure as specified in 7.6.3.4.2.

#### 7.6D.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO.

#### 7.6D.3.5 Test requirement

Same test requirement as specified in 7.6.3.5.

#### Table 7.6D.3.5-1: Void

# 7.6D.4 Narrow band blocking for UL MIMO

#### 7.6D.4.1 Test purpose

Narrow band blocking for UL MIMO is defined for a receiver's ability of an UE that supports UL MIMO to receive a NR signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of narrow-band blocking ability will decrease the coverage area when other g-NodeB transmitters exist (except in the adjacent channels and spurious response).

#### 7.6D.4.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

#### 7.6D.4.3 Minimum conformance requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in subclause 7.6 shall be met with the UL MIMO configurations described in sub-clause 6.2D.1. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6D.

- 7.6D.4.4 Test description
- 7.6D.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.6D.4.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes

A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions						
Test Environment as specified in TS			Normal			
38.508-1 [5] subclause 4.1						
Test Frequ	uencies as specified in T	S	Mid range	Mid range		
38.508-1 [	5] subclause 4.3.1		-			
Test Chan	nel Bandwidths as speci	fied in	Lowest, Mid,	Highest		
TS 38.508	-1 [5] subclause 4.3.1			-		
Test SCS	as specified in Table 5.3	.5-1	Lowest			
		Т	est Parameter	S		
	Downlink Co	onfigura	ition	Uplink Config	guration	
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation	
1	CP-OFDM QPSK	1	NOTE 1	CP-OFDM QPSK	NOTE 1	
NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3D.2.4.1-1.						
NOTE 2:	I: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas					
ports connected and 4Rx REFSENS re				ent (Table 7.3.2.5-2) is us	sed in the test	
	requirements.	requirements.				

#### Table 7.6D.4.4.1-1: Test Configuration Table

- 1. Connect the SS and interfering source to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.5 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.6D.4.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.6D.4.4.3.

7.6D.4.4.2 Test procedure

Same test procedure as specified in 7.6.4.4.2.

7.6D.4.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO.

7.6D.4.5 Test requirement

Same test requirement as specified in 7.6.4.5.

#### Table 7.6D.4.5-1: Void

# 7.6E Blocking characteristics for V2X

# 7.6E.1 General

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

# 7.6E.2 In-band blocking for V2X

## 7.6E.2.0 Minimum conformance requirements

#### 7.6E.2.0.1 General

The throughput of the wanted signal shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annex A.7.2 with parameters specified in Table 7.6E.2.0.1-1 and Table 7.6E.2.0.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

RX parameter	Units	Channel bandwidth				
		10 MHz	20 MHz	30 MHz	40 MHz	
Power in transmission bandwidth configuration	dBm	Bm PREFSENS_V2X + channel bandwidth specific value		value below		
	dB	6	9	11	12	
BW _{interferer}	MHz	10				
Floffset, case 1	MHz	15				
Floffset, case 2	MHz	25				
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Norm cyclic prefix is used.				ols. Normal		

Table 7.6E.2.0.1-2: In-band blocking for NR V2X

NR band	Parameter	Unit	Case 1	Case 2			
n38, n47	Pinterferer	dBm	-44	-44			
	Finterferer (offset)	MHz	-BW/2 - Floffset, case 1	≤ -BW/2 - Floffset, case 2			
			and	and			
			BW/2 + Floffset, case 1	≥ BW/2 + Floffset, case 2			
	Finterferer	MHz	NOTE 2	$F_{DL_{low}} - 30$			
				to			
				F _{DL_high} + 30			
	NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE						
receive	e band, but within the firs	st 15 MHz	below or above the UE rec	eive band.			
			ent is valid for two frequenci	ies:			
	a. the carrier frequency -BW/2 - Floffset, case 1 and						
	b. the carrier frequency +BW/2 + Floffset, case 1						
NOTE 3: FInterfer	NOTE 3: Finterferer range values for unwanted modulated interfering signal are interferer centre						
frequencies							
	NOTE 4: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to						
$\left( \left  F_{\text{inter}} \right  \right)$	$\left(\left F_{\text{interferer}}\right /SCS ight +0.5 ight)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in						
MHz. The interferer is an NR signal with 15 kHz SCS.							

#### 7.6E.2.0.2 In-band blocking for V2X con-current operation

For the inter-band con-current NR V2X operation, the requirements specified in clause 7.6E.2.0.1 shall apply for the NR sidelink reception in the operating Bands in Table 5.2E.1-1 and the requirements specified in clause 7.6.2 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6E.2.

### 7.6E.2.1 In-band blocking for V2X / non-concurrent operation

FFS

### 7.6E.2.2 In-band blocking for V2X / con-current operation

FFS

# 7.6E.3 Out-of-band blocking for V2X

# 7.6E.3.0 Minimum conformance requirements

#### 7.6E.3.0.1 General

For NR V2X bands out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 30 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.6E.3.0.1-1 and Table 7.6E.3.0.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

RX parameter	Units	Channel bandwidth			
		10 MHz	20 MHz	30 MHz	40 MHz
Power in transmission bandwidth dBm configuration		PREFSENS_V2X + channel bandwidth specific value below			
	dB	6	9	11	12
NOTE: Reference measurement channel is A.7.2.					

#### Table 7.6E.3.0.1-1: Out-of-band blocking parameters for NR V2X

NR band	Parameter	Units	Range 1	Range 2	Range 3		
n47	Pinterferer	dBm	-44	-30	-15		
	Finterferer (CW)	MHz	F _{DL_low} -30 to	F _{DL_low} -60 to	F _{DL_low} -85 to		
			FDL_low -60	FDL_low -85	1 MHz		
			F _{DL_high} +30 to	FDL_high +60 to	FDL_high +85 to		
			F _{DL_high} + 60	F _{DL_high} +85	+12750 MHz		
n38	Pinterferer	dBm	-44	-30	-15		
	Finterferer (CW)	MHz	F _{DL_low} -30 to	F _{DL_low} -60 to	F _{DL_low} -85 to		
			FDL_low -60	FDL_low -85	1 MHz		
	NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for						
	F _{Interferer} > 4400 MHz.						

#### 7.6E.3.0.2 Out-of-band blocking for V2X con-current operation

For the inter-band con-current NR V2X operation, the requirements specified in clause 7.6E.3.0.1 shall apply for the NR sidelink reception in Band n47 and the requirements specified in clause 7.6.3 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6E.3.

#### 7.6E.3.1 Out-of-band blocking for V2X / non-concurrent operation

FFS

7.6E.3.2 Out-of-band blocking for V2X / con-current operation

FFS

# 7.6F Blocking characteristics for shared spectrum channel access

# 7.6F.1 General

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a

specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

# 7.6F.2 In-band blocking

#### 7.6F.2.1 In-band blocking for shared spectrum channel access

#### 7.6F.2.1.1 Test purpose

In-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 60 MHz below or above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channel.

#### 7.6F.2.1.2 Test applicability

This test case applies to all types of NR UE release 16 and forward that support NR standalone shared spectrum channel access..

#### 7.6F.2.1.3 Minimum conformance requirements

In-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 60 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6F.2.1.3-1 and Table 7.6F.2.1.3-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

#### Table 7.6F.2.1.3-1: In-band blocking parameters for shared access bands

RX parameter	Units	Channel bandwidth			
		20 MHz	40 MHz	60 MHz	80 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + channel band		width specific value below	
	dB	9	12	13.8	15
BWinterferer	MHz	20			
Floffset, case 1	MHz	30			
Floffset, case 2	MHz	≥ 50			

Operating band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
	Finterferer (Offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
			Floffset, case 1	Floffset, case 2			
			and	and			
			CBW/2 +	≥ CBW/2 +			
			Floffset, case 1	Floffset, case 2			
n46, n96	Finterferer		NOTE 2	F _{DL_low} – 3*CBW			
				to			
				F _{DL_high} + 3*CBW,			
				NOTE 4			
			ferer offset Finterfere				
fu	irther adjusted to (	$F_{\rm interferer}$ /	<i>SCS</i> ]+0.5) <i>SCS</i> MH	z with SCS the			
SU	sub-carrier spacing of the wanted signal in MHz. The interferer is an						
N	R signal with an SC	CS equal t	o that of the wanted	signal.			
NOTE 2: F	NOTE 2: For each carrier frequency, the requirement applies for two interferer						
carrier frequencies: a: -CBW/2 - Floffset, case 1; b: CBW/2 + Floffset, case 1							
NOTE 3: CBW denotes the channel bandwidth of the wanted signal							
NOTE 4: Interferer carrier frequencies in the frequency range for Case 2 shall be							
located at discrete frequencies in integer multiples of 20 MHz offset from -							
	CBW/2 - Floffset, case 2 and CBW/2 + Floffset, case 2						

Table 7.6F.2.1.3-2: In-band blocki	ng for shared access bands

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6F.2.1.

#### 7.6F.2.1.4 Test description

#### 7.6F.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.6F.2.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

#### Table 7.6F.2.1.4.1-1: Test Configuration Table

#### FFS

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.1 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.6F.2.1.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.6.2.4.3.

#### 7.6F.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6F.2.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6F.2.1.4.1-1. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
- 3. Set the parameters of the signal generator for an interfering signal below the wanted signal in according to Tables 7.6F.2.1.5-1 and 7.6F.2.1.5-2.
- 4. Set the downlink signal level according to the table 7.6F.2.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6F.2.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW.
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## 7.6F.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with TRANSFORM_PRECODER_ENABLED condition in Table 4.6.3-118 PUSCH-Config.

## 7.6F.2.1.5 Test requirement

For shared spectrum channel access band, the throughput measurement derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex in Annexes A.2.2, A.2.3 and A.3.2 with parameters specified in Tables 7.6F.2.1.5-1 and Tables 7.6F.2.1.5-2.

RX parameter	Units	Channel bandwidth					
		20 MHz	40 MHz	60 MHz	80 MHz		
Power in transmission bandwidth configuration	dBm	REFSENS + channel bandwidth specific value below					
	dB	9	12	13.8	15		
BWinterferer	MHz	20					
Floffset, case 1	MHz	30					
Floffset, case 2	MHz	≥ 50					
NOTE 1: The tra	ansmitter sh	all be set to 4 d	B below PCMAX_L,f	,c at the minimum	n UL		
configuration specified in Table 7.3.2-3 with PCMAX_Lf.c defined in clause [6.2F.4].							
NOTE 2: The in	E 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with						
one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1							

Table 7.6F.2.1.5-1: In-band blocking parameters for	or shared access bands
-----------------------------------------------------	------------------------

Operating band	Parameter	Unit	Case 1	Case 2			
	Pinterferer	dBm	-56	-44			
	Finterferer (offset)	MHz	-CBW/2 –	≤ -CBW/2 –			
			Floffset, case 1	Floffset, case 2			
			and	and			
			CBW/2 +	≥ CBW/2 +			
			Floffset, case 1	Floffset, case 2			
n46, n96	Finterferer		NOTE 2	F _{DL_low} – 3*CBW			
				to			
				F _{DL_high} + 3*CBW,			
				NOTE 4			
			ferer offset Finterfere				
fu	Irther adjusted to (	F _{interferer} /	<i>scs</i>	z with SCS the			
s	ub-carrier spacing of	of the wan	ted signal in MHz. Th	ne interferer is an			
			o that of the wanted				
	NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -CBW/2 – Floffset, case 1; b: CBW/2 + Floffset, case 1						
	NOTE 3: CBW denotes the channel bandwidth of the wanted signal						
	NOTE 4: Interferer carrier frequencies in the frequency range for Case 2 shall be						
	located at discrete frequencies in integer multiples of 20 MHz offset from -						
located a			ger multiples of 20 M d CBW/2 + F _{loffset, case}				

 Table 7.6F.2.1.5-2: In-band blocking for shared access bands

7.6F.2.2 In-band blocking for Intra-band contiguous shared spectrum channel access CA

FFS

## 7.6F.3 7.6F.3 Out-of-band blocking

## 7.6F.3.1 Out-of-band blocking for shared spectrum channel access

## 7.6F.3.1.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, and with the present of CW interfering signal falling outside a frequency range 60 MHz or greater below or above the UE receive band.

## 7.6F.3.1.2 Test applicability

This test case applies to all types of NR UE release 16 and forward that support NR standalone shared spectrum channel access.

## 7.6F.3.1.3 Minimum conformance requirements

Out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 60 MHz or greater below or above the UE receive band. The throughput of the wanted signal shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6F.3.1.3-1 and Table 7.6F.3.1.3-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

RX parameter	Units	Channel bandwidth				
		20 MHz	40 MHz	60 MHz	80 MHz	
Power in transmission bandwidth configuration	dBm	REFSENS + channel bandwidth specific value below				
	dB	9				
NOTE 1: The tra configu		hall be set to 4 dE bified in Table 7.3	/			

 Table 7.6F.3.1.3-1: Out-of-band blocking parameters for shared access bands

Operating band	Parameter	Unit	Range1	Range 2	Range 3	
	Pinterferer	dBm	-44	-30	-15	
n46, n96	Finterferer (CW)	MHz	N/A	-200 < f - F _{DL_low} ≤ -3*CBW or 3*CBW ≤ f - F _{DL_high} < 200	$\begin{array}{l} 1 \leq f \leq F_{DL_low} - \\ MAX(200,3^*CBW) \\ or \\ F_{DL_high} + \\ MAX(200,3^*CBW) \\ \leq f \leq 12750 \end{array}$	
NOTE 1: The power level of the interferer (P _{Interferer} ) for Range 3 shall be modified to -20 dBm for F _{Interferer} > 4200 MHz.						
NOTE 2: C	BW denotes the cl	nannel ban	dwidth of the wanted sig	Inal		

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6F.3.1.3-2, a maximum of

 $\lfloor \max\{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil\} / \min\{\lfloor n \cdot N_{RB} / 10 \rfloor, 5\} \rfloor$ 

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(CBW/2_{5})$  MHz with  $N_{BB}$  the number of resource blocks in the downlink transmission bandwidth configuration, *CBW* the bandwidth of the frequency channel in MHz and n = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7F apply.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.6F.3.1

7.6F.3.1.4 Test description

7.6F.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing are shown in Table 7.6F.3.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.3.

		De	afault Conditio	ns		
Test Environment as specified in TS			Normal			
38.508-1 [5] subclause 4.1						
	encies as specified in TS	S	One frequence	cy chosen arbitrarily from	low or high range	
	5] subclause 4.3.1					
	nel Bandwidths as specif	fied in	Lowest, Mid,	Highest		
	-1 [5] subclause 4.3.1					
	Test SCS as specified in TS 38.508-1 [5]		Lowest			
subclause	4.3.1					
		Т	est Parameter	-		
	Downlink Co	onfigura	ition	Uplink Config	juration	
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation	
1	CP-OFDM QPSK	CP-OFDM QPSK NOTE 1 DFT-s-OFDM QPSK NOTE 1				
NOTE 1:	NOTE 1: The specific configuration of uplink and downlink are defined in Table Table 7.3F.2.4.1-2					
and Table 7.3F.2.4.1-3.						
NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas						
	ports connected and 4R: requirements.	x REFS	ENS requireme	ent (Table 7.3F.2.5-2) is ι	ised in the test	

### Table 7.6F.3.1.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508 [5] Annex A, in Figure A.3.1.4.2 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The UL and DL Reference Measurement channels are set according to Table 7.6F.3.1.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.6F.3.1.4.2.

7.6F.3.1.4.2 Test Procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6F.3.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6F.3.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6F.3.1.5-2. The frequency step size is min( $|BW_{channel}/2|$ ,5) MHz.
- 4. Set the downlink signal level according to Table 7.6F.3.1.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.6F.3.1.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.

- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.
- 6. Record the frequencies for which the throughput doesn't meet the requirements.
- 7. Repeat steps from 3 to 6, using an interfering signal above the wanted signal at step 3.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

### 7.6F.3.1.4.2 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

#### 7.6F.3.1.5 Test Requirement

For NR bands with shared spectrum channel access, the throughput measurement derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 with parameters specified in Table 7.6F.3.1.5-1 and Table 7.6F.3.1.5-2.

The number of spurious response frequencies recorded in the final step of test procedure shall not exceed  $\lfloor \max\{24,6 \cdot \lceil n \cdot N_{RB} / 6\rceil\}/\min\{\lfloor n \cdot N_{RB} / 10\rfloor,5\}\rfloor$  in each assigned frequency channel when measured using a  $\min(\lfloor BW_{channel} / 2\rfloor,5)$  MHz step size. For these exceptions the requirements of clause 7.7F Spurious Response are applicable.

#### Table 7.6F.3.1.5-1: Out-of-band blocking parameters for shared access bands

RX parameter	Units	Channel bandwidth					
		20 MHz	40 MHz	60 MHz	80 MHz		
Power in transmission bandwidth configuration	dBm	REFSENS + channel bandwidth specific value below					
	dB	9					
NOTE 1: The tra configu		hall be set to 4 dE bified in Table 7.3	/	1-			

Operating band	Parameter	Unit	Range1	Range 2	Range 3		
	Pinterferer	dBm	-44	-30	-15		
n46, n96	Finterferer (CW)	MHz	N/A	-200 < f - F _{DL_low} ≤ -3*CBW or 3*CBW ≤ f - F _{DL_high} < 200	$\begin{array}{c} 1 \leq f \leq F_{\text{DL_low}} - \\ \text{MAX}(200,3^{*}\text{CBW}) \\ \text{or} \\ F_{\text{DL_high}} + \\ \text{MAX}(200,3^{*}\text{CBW}) \\ \leq f \leq 12750 \end{array}$		
	NOTE 1: The power level of the interferer (P _{Interferer} ) for Range 3 shall be modified to -20 dBm for F _{Interferer} > 4200 MHz.						
NOTE 2: C	BW denotes the ch	nannel ban	dwidth of the wanted sig	nal			

## 7.7 Spurious response

### 7.7.1 Test Purpose

Spurious response is a measure of the ability of the receiver to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency for which a response is obtained, i.e. for which the out-of-band blocking limit as specified in subclause 7.6.3 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

## 7.7.2 Test Applicability

This test applies to all types of NR UE release 15 and forward.

## 7.7.3 Minimum Conformance Requirements

The throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3(with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters for the wanted signal as specified in Table 7.7.3-1 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and in Table 7.7.3-1a for NR bands with  $F_{DL_high} \geq 3300$  MHz and  $F_{UL_high} \geq 3300$  MHz and for the interferer as specified in Table 7.7.3-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

## Table 7.7.3-1: Spurious response parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

RX parameter	Units	Channel bandwidth (MHz)				
		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100		
Power in transmission bandwidth configuration ²	dBm	REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB		
<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: 10log₁₀(x) is rounded to the next higher 0.5dB value.</li> </ul>						

## Table 7.7.3-1a: Spurious response parameters for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz MHz

RX parameter	Units	Channel bandwidth (MHz)				
		10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100		
Power in transmission bandwidth configuration	dBm	REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + 9 dB		
NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX L,f,c} defined in clause 6.2.4.						

## Table 7.7.3-2: Spurious response

Parameter	Unit	Level
P _{Interferer} (CW)	dBm	-44
FInterferer	MHz	Spurious response frequencies

The normative reference for this requirement is TS 38.101-1 [2] clause 7.7.

7.7.4 Test Description

7.7.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.3.4.1 in order to test spurious responses obtained in clause 7.6.3 under the same conditions.

## 7.7.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

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- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6.3.4.1-1. Since the UE has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.3.4.2.
- 4. Set the downlink signal level according to the table 7.7.5-1 or 7.7.5-1a. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.7.5-1 or 7.7.5-1a for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## 7.7.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

## 7.7.5 Test Requirement

The throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 with parameters for the wanted signal as specified in Table 7.7.5-1 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and in Table 7.7.5-1a for NR bands with  $F_{DL_high} \geq 3300$  MHz and  $F_{UL_high} \geq 3300$  MHz and for the interferer as specified in Table 7.7.5-2.

## Table 7.7.5-1: Spurious response parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

RX parameter	Units	Channel bandwidth (MHz)						
		5, 10	15	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100				
Power in transmission bandwidth configuration ² REFSENS + REFSENS + REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB								
Table	configuration ² I       I         NOTE 1:       The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.         NOTE 2:       10log10(x) is rounded to the next higher 0.5dB value.							

## Table 7.7.5-1a: Spurious response parameters for NR bands with $F_{DL_{low}} \ge 3300 \text{ MHz}$ and $F_{UL_{low}} \ge 3300 \text{ MHz}$

RX parameter	Units	Channel bandwidth (MHz)						
		10 15 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100						
Power in transmission bandwidth configuration     REFSENS + 6 dB     REFSENS + 7 dB     REFSENS + 9 dB								
	NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.							

## Table 7.7.5-2: Spurious response

Parameter	Unit	Level
P _{Interferer} (CW)	dBm	-44
FInterferer	MHz	Spurious response frequencies

## Table 7.7.5-3: Void

## 7.7A Spurious response for CA

## 7.7A.0 Minimum conformance requirements

7.7A.0.1 Minimum conformance requirements for intra-band contiguous CA

The normative reference for this requirement is TS 38.101-1 [2] clause 7.7A.1.

## Table 7.7A.0.1-1: Spurious response parameters for intra-band contiguous CA

RX parameter	Units	BW Class				
		B C D				
Power in	er in dBm REFSENS + channel specific value below					
transmission dB 9 9 9 bandwidth configuration						
NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.						

Table 7.7A.0.1-2: Spurious response	se for CA
-------------------------------------	-----------

Parameter	Unit	Level
P _{Interferer} (CW)	dBm	-44
FInterferer	MHz	Spurious response frequencies

## 7.7A.0.2 Void

## 7.7A.0.3 Minimum conformance requirements for inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the spurious response are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.7 for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.7.3-2 is increased by the amount given by  $\Delta R_{IB,c}$  defined in Table 7.3A.0.3.2.1-1.

The throughput of each carrier shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

The normative reference for this requirement is TS 38.101-1 [2] clause 7.7A.3.

## 7.7A.0.4 Minimum conformance requirements for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, the spurious response requirements are defined with the uplink configuration in accordance with Table 7.3A.0.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in clauses 7.7 and 7.7A.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply with all downlink carriers active.

The throughput of each carrier shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.7A.1 Spurious response for CA (2DL CA)

## 7.7A.1.1 Test Purpose

Spurious response for 2DL CA verifies the receiver's ability to receive a wanted 2DL carrier aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6A.3 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

### 7.7A.1.2 Test Applicability

This test case applies to all types of NR UE release 15 and forward that support 2DL CA.

### 7.7A.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.1.4 Test Description

### 7.7A.1.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6A.3.1.4.1 in order to test spurious responses obtained in clause 7.6A.3.1 under the same conditions.

### 7.7A.1.4.2 Test Procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.7A.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Test Configuration Table 7.6A.3.1.4.1-1, 7.6A.3.1.4.1-2 or 7.6A.3.1.4.1-3 in Clause 7.6A.3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Test Configuration Table 7.6A.3.1.4.1-1, 7.6A.3.1.4.1-2 or 7.6A.3.1.4.1-3 in Clause 7.6A.3 on both PCC and SCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

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- 6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7A.0.1-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6A.3 Out-of-band blocking for CA.
- 7. Set the downlink signal level according to Table 7.7A.0.1-1 for both carriers. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.7A.0.1-1 + (10log(P_L_{CRB}/N_{RB_alloc}) for PCC, 10log(S_L_{CRB}/N_{RB_alloc}) for SCC) for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. For each spurious frequency, measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex H.2A.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## Table 7.7A.1.4.2-1: Void

## 7.7A.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

## 7.7A.1.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.7A.0.1-1 and 7.7A.0.1-2. For the UE which supports inter-band 2DL CA configuration in Table7.3A.0.3.2.1-1, P_{Interferer} power defined in Table 7.7A.0.1-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

## 7.7A.2 Spurious response for 3DL CA

## 7.7A.2.1 Test Purpose

Spurious response for 3DL CA verifies the receiver's ability to receive a wanted 3DL carrier aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6A.3 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

## 7.7A.2.2 Test Applicability

This test case applies to all types of NR UE release 15 and forward that support 3DL CA.

## 7.7A.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

## 7.7A.2.4 Test Description

## 7.7A.2.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6A.3.2.4.1 in order to test spurious responses obtained in clause 7.6A.3.2 under the same conditions.

### 7.7A.2.4.2 Test Procedure

Same test procedure as sub-clause 7.7A.1.4.2 with the following exceptions:

Step 1, 2 and 4 of Test Procedure as in clause 7.7A.1.4.2 is replaced by:

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Test Configuration Table 7.6A.3.1.4.1-1, 7.6A.3.1.4.1-2 or 7.6A.3.1.4.1-3 in Clause 7.6A.3 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Test Configuration Table 7.6A.3.1.4.1-1, 7.6A.3.1.4.1-2 or 7.6A.3.1.4.1-3 in Clause 7.6A.3 on both PCC and SCCs. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
- 4. Set the downlink signal level according to Table 7.7A.0.1-1 for both carriers. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.7A.0.1-1 + (10log(P_L_{CRB}/N_{RB_alloc}) for PCC, 10log(S_L_{CRB}/N_{RB_alloc}) for SCC) for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.

## 7.7A.2.4.3 Message Contents

Same message contents as sub-clause 7.7A.1.4.3.

### 7.7A.2.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.7A.0.1-1 and 7.7A.0.1-2. For the UE which supports inter-band 3DL CA configuration in Table 7.3A.0.3.2.3-1, P_{Interferer} power defined in Table 7.7A.0.1-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.3-1.

## 7.7A.3 Spurious response for 4DL CA

### 7.7A.3.1 Test Purpose

Spurious response for 4DL CA verifies the receiver's ability to receive a wanted 4DL carrier aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6A.3 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

### 7.7A.3.2 Test Applicability

This test case applies to all types of NR UE release 15 and forward that support 4DL CA.

## 7.7A.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.3.4 Test Description
---------------------------

7.7A.3.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6A.3.3.4.1 in order to test spurious responses obtained in clause 7.6A.3.3 under the same conditions.

7.7A.3.4.2 Test Procedure

Same test procedure as sub-clause 7.7A.2.4.2.

## 7.7A.3.4.3 Message Contents

Same message contents as sub-clause 7.7A.1.4.3.

## 7.7A.3.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.7A.0.1-1 and 7.7A.0.1-2.For the UE which supports inter-band 4DL CA configuration in Table 7.3.2_1.3-1 and Table 7.3A.0.3.2.4-1, P_{Interferer} power defined in Table 7.7A.0.1-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3.2_1.3-1 and Table 7.3A.0.3.2.4-1.

## 7.7B Spurious response for NR-DC

For inter-band NR-DC configurations, the spurious response for the corresponding inter-band CA configuration as specified in clause 7.7A applies.

Note: For NR-DC testing, replace CA by NR-DC, PCC by PCell, and SCC by PSCell in clause 7.7A.

## 7.7D Spurious response for UL MIMO

## 7.7D.1 Test Purpose

Spurious response verifies the ability of the UE that support UL MIMO to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking for UL MIMO limit as specified in sub-clause 7.6D.3 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

### 7.7D.2 Test Applicability

This test applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

### 7.7D.3 Minimum Conformance Requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in Clause 7.7.3 shall be met with the UL MIMO configurations specified in Table 6.2D.1.4.1-1 in Clause 6.2 D.1 UE maximum output power for UL MIMO. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmitter antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.7D.

## 7.7D.4 Test Description

## 7.7D.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6D.3.4.1 in order to test spurious responses obtained in clause 7.6D.3 under the same conditions.

## 7.7D.4.2 Test Procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Test Configuration Table 7.6D.3.4.1-1 in Clause 7.6D.3. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Test Configuration Table 7.6D.3.4.1-1 in Clause 7.6D.3. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. The PDCCH DCI format 0_1 is specified with condition 2TX_UL_MIMO in 38.508-1 [5] subclause 4.3.6.1.1.2.
- 3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6D.3.4.2.
- 4. Set the downlink signal level according to the Table 7.7.5-1 or 7.7.5-1a. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, 3.4 dB of the target level in table 7.7.5-1a in table 7.7.5-1 for carrier frequency  $f \le 3.0$ GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz <  $f \le 4.2$ GHz, for at least the duration of the throughput measurement.
- 5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.

## 7.7D.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] clause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO.

## 7.7D.5 Test Requirement

Same test requirement as specified in 7.7.5.

## 7.7E Spurious response for V2X

## 7.7E.0 Minimum conformance requirements

## 7.7E.0.1 General

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency for which a response is obtained, i.e. for which the out-of-band blocking limit as specified in clause 7.6E.3 is not met.

The throughput shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters for the wanted signal as specified in Table 7.7E.0.1-1 and Table 7.7E.0.1-2 for NR V2X bands. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

RX parameter	Units	Channel bandwidth			
		10 MHz	20 MHz	30 MHz	40 MHz
Power in transmission bandwidth configuration	dBm	P _{REFSENS_V2X} + channel bandwidth specific value below			
	dB	6	9	11	12
NOTE 1: Reference measurement channel is A.7.2					

### Table 7.7E.0.1-1: Spurious response parameters for NR V2X

Parameter	Unit	Level
PInterferer (CW)	dBm	-44
FInterferer	MHz	Spurious response frequencies

#### Table 7.7E.0.1-2: Spurious response for NR V2X

## 7.7E.0.2 Spurious response for V2X con-current operation

For the inter-band con-current NR V2X operation, the requirements specified in clause 7.7E.0.1 shall apply for the NR sidelink reception in the operating Bands in Table 5.2E.1-1 and the requirements specified in clause 7.7 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.7E.

- 7.7E.1 Spurious response for V2X / non-concurrent operation
- 7.7E.2 Spurious response for V2X / con-current operation

## 7.7F Spurious response for shared spectrum channel access

## 7.7F.1 Spurious response for shared spectrum channel access

## 7.7F.1.1 Test Purpose

Spurious response verifies the ability of the UE that supports shared spectrum channel access to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking for shared spectrum channel access as specified in sub-clause 7.6F.3.1 is not met.

## 7.7F.1.2 Test Applicability

This test case applies to all types of NR UE release 16 and forward that support NR standalone shared spectrum channel access.

## 7.7F.1.3 Minimum Conformance Requirements

For spurious responses, the throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.7F.1.3-1 and Table 7.7F.1.3-2. The relative throughput requirement shall be met for any SCS at any other frequency at which a response is obtained i.e. for which the limit as specified in clause 7.6F.3.1 is not met.

Table 7.7F.1.3-1: Spurious response parameters for	or shared access bands
----------------------------------------------------	------------------------

RX parameter	Units	Channel bandwidth						
		20 MHz 40 MHz 60 MHz 80 MHz						
Power in	dBm	REFSENS + channel bandwidth specific value below						
transmission	dB	9						
bandwidth								
configuration	configuration							
NOTE 1: The transmitter shall be set to 4 dB below PCMAX_L,f,c at the minimum UL								
configu	configuration specified in Table 7.3F.2.3-3 with PCMAX_L,f,c defined in clause 6.2.4.							

### Table 7.7F.1.3-2: Spurious response for shared spectrum channel access

Parameter	Unit	Level
PInterferer (CW)	dBm	-44
FInterferer	MHz	Spurious response frequencies

The normative reference for this requirement is TS 38.101-1 [2] clause 7.7F.1

## 7.7F.1.4 Test Description

## 7.7F.1.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6F.3.1.4.1 in order to test spurious responses obtained in clause 7.6.3 under the same conditions.

## 7.7F.1.4.2 Test Procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6F.3.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.6F.3.1.4.1-1. Since the UE has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7F.1.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6F.3.1.4.2.
- 4. Set the downlink signal level according to Table 7.7F.1.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.7F.1.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## 7.7F.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

## 7.7F.1.5 Test Requirements

The throughput measurement derived in test procedure shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 with parameters for the wanted signal as specified in Table 7.7F.1.5-1, and for the interferer as specified in Table 7.7F.1.5-2.

RX parameter	Units	Channel bandwidth			
		20 MHz	40 MHz	60 MHz	80 MHz
Power in	dBm	REFSENS + channel bandwidth specific value below			
transmission	dB	9			
bandwidth					
configuration					
NOTE 1: The transmitter shall be set to 4 dB below PCMAX_L,f,c at the minimum UL					
configuration specified in Table 7.3F.2.3-3 with P _{CMAX L,f,c} defined in clause 6.2.4.					

Parameter	Unit	Level
PInterferer (CW)	dBm	-44
FInterferer	MHz	Spurious response frequencies

## 7.7F.2 Intra-band contiguous shared spectrum channel access CA

FFS

## 7.8 Intermodulation characteristics

## 7.8.1 General

Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal

## 7.8.2 Wide band Intermodulation

7.8.2.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

## 7.8.2.2 Test applicability

This test applies to all types of NR UE release 15 and forward.

### 7.8.2.3 Minimum conformance requirements

The wide band intermodulation requirement is defined using a CW carrier and modulated NR signal as interferer 1 and interferer 2 respectively.

The throughput shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8.2.3-1 for NR bands with  $F_{DL_high} < 2700$  MHz and  $F_{UL_high} < 2700$  MHz and Table 7.8.2.3-2 for NR bands with  $F_{DL_low} \ge 3300$  MHz and  $F_{UL_low} \ge 3300$  MHz. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.8.2.3-1: Wide band intermodulation parameters for NR bands with F _{DL_high} < 2700 MHz and
F _{UL high} < 2700 MHz

Rx parameter	Units	Channel bandwidth (MHz)			
•		5, 10 15 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
P _w in Transmission Bandwidth Configuration, per CC ⁵	dBm	REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB	
PInterferer 1 (CW)	dBm			-46	
P _{Interferer 2} (Modulated)	dBm	-46			
BWInterferer 2	MHz	5			
F _{Interferer 1} (Offset)	MHz	-BW/2 - 7.5 / +BW/2 + 7.5			
F _{Interferer 2} (Offset)	MHz	2*FInterferer 1			
Рсмах NOTE 2: Pattern OP.1 FD	L_L,f,c define Referenc D/TDD fo	d in clause 6.2 e measuremen r the DL-signa	.4. t channel is sp l as described	^{EMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with becified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG in Annex A.5.1.1/A.5.2.1). Berence measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with	
one s SCS. NOTE 4: The F centre carrie	ided dynan _{interferer 1} (of frequency r closest to	hic OCNG Pati fset) is the frec / of the CW int	ern OP.1 FDE quency separa erferer and Fin and the centre	D/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz tion of the centre frequency of the carrier closest to the interferer and the terferer 2 (offset) is the frequency separation of the centre frequency of the e frequency of the modulated interferer.	

## Table 7.8.2.3-2: Wide band intermodulation parameters for NR bands with $F_{DL_{low}} \ge 3300 \text{ MHz}$ and F_{UL_low} ≥ 3300 MHz

Rx	Units	Channel bandwidth (MHz)			
parameter		10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
P _w in	dBm	REFSENS + 6dB			
Transmission					
Bandwidth					
Configuration					
, per CC					
P _{Interferer 1} (CW)	dBm	-46			
PInterferer 2	dBm	-46			
(Modulated)					
BWInterferer 2	MHz	BW			
FInterferer 1	MHz	-2BW			
(Offset)					
_		+2BW			
F _{Interferer 2} (Offset)	MHz	2*Finterferer 1			
NOTE 1: The	e transmitte	er shall be set to 4dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with			
	_ / / ·	ned in clause 6.2.4.			
		easurement channel is specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic n OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).			
with	n one sideo	d interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and S as the wanted signal.			
cer	: The F _{interferer 1} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and F _{interferer 2} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.				

The normative reference for this requirement is TS 38.101-1 [2] clause 7.8.2.

7.8.2.4 Test description

7.8.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.8.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

	Default Conditions					
Test Environment as specified in TS			Normal			
38.508-1 [	5] subclause 4.1					
	uencies as specified in T	S	Mid range (N	OTE 4)		
38.508-1 [	5] subclause 4.3.1					
	nel Bandwidths as speci	fied in	Lowest, Mid,	5		
TS 38.508	-1 [5] subclause 4.3.1		Lowest UL / Lowest DL, Lowest UL / Highest DL			
			(NOTE 3)			
Test SCS	as specified in Table 5.3		Highest			
		Т	est Parameter	S		
	Downlink Co	onfigura	ition	Uplink Configuration		
Test ID	Mod'n	RB allocation		Mod'n	RB allocation	
1	CP-OFDM QPSK	NOTE 1		DFT-s-OFDM QPSK	NOTE 1	
				nk are defined in Table 7.		
NOTE 2:	In a band where UE sup	ports 4F	Rx, the test sha	Il be performed only with	4Rx antennas	
	ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test					
	requirements.					
	Additional test points selected according to asymmetric channel bandwidths specified in					
	clause 5.3.6. DL channel bandwidth shall be selected first.					
NOTE 4:	For NR band n28, 30MHz test channel bandwidth is tested with Low range test					
	frequencies.					

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.5.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity NR, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.5.4.3.

### 7.8.2.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.8.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.8.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

- 3. Set the Downlink signal level to the value as defined in Table 7.8.2.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.8.2.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 4. Set the Interfering signal levels to the values as defined in Table 7.8.2.5-1 and frequency below the wanted signal.
- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
- 6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 4.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

## 7.8.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with DFT-s-OFDM condition in Table 4.6.3-118 PUSCH-Config.

### 7.8.2.5 Test requirement

The throughput shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.2.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

## Table 7.8.2.5-1: Wide band intermodulation parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

Rx parameter	Units	Channel bandwidth (MHz)			
-		5, 10 15 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
P _w in Transmission Bandwidth Configuration, per CC ⁵	dBm	REFSENS + 6 dB	REFSENS + 7 dB	REFSENS + (9 + 10log ₁₀ (BW _{Channel} /20)) dB	
PInterferer 1 (CW)	dBm			-46	
P _{Interferer 2} (Modulated)	dBm	-46			
BWInterferer 2	MHz	5			
F _{Interferer 1} (Offset)	MHz	-BW/2 – 7.5 / +BW/2 + 7.5			
F _{Interferer 2} (Offset)	MHz	2*FInterferer 1			
NOTE 1: The transmitter shall be set to 4 dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P _{CMAX_L,f,c} defined in clause 6.2.4.         NOTE 2: Reference measurement channel is specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).					
<ul> <li>NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz SCS.</li> <li>NOTE 4: The F_{interferer 1} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and F_{interferer 2} (offset) is the frequency of the centre frequen</li></ul>					
NOTE 5: 10log	NOTE 5: 10log ₁₀ (x) is rounded to the next higher 0.5dB value.				

## Table 7.8.2.5-2: Wide band intermodulation parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

Rx	Units	Channel bandwidth (MHz)			
parameter		10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100			
P _w in	dBm	REFSENS + 6dB			
Transmission					
Bandwidth					
Configuration					
, per CC					
P _{Interferer 1} (CW)	dBm	-46			
PInterferer 2	dBm	-46			
(Modulated)					
BWInterferer 2	MHz	BW			
FInterferer 1	MHz	-2BW			
(Offset)					
_		+2BW			
F _{Interferer 2} (Offset)	MHz	2*Finterferer 1			
NOTE 1: The	e transmitte	er shall be set to 4dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with			
	_ / / ·	ned in clause 6.2.4.			
		easurement channel is specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic n OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).			
with	n one sideo	d interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and S as the wanted signal.			
cer	: The F _{interferer 1} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and F _{interferer 2} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.				

## Table 7.8.2.5-3: Void

## 7.8A Intermodulation characteristics for CA

## 7.8A.1 General

- 7.8A.2 Wide band Intermodulation for CA
- 7.8A.2.0 Minimum conformance requirements

## 7.8A.2.0.1 Wide band Intermodulation for Intra-band contiguous CA

## Table 7.8A.2.0.1-1: Wide band intermodulation parameters for intra-band contiguous CA with $F_{DL_{low}} \ge$ 3300 MHz and $F_{UL_{low}} \ge$ 3300 MHz

<b>D</b>		N	R CA bandwidth clas	SS				
Rx parameter	Units	BC	C	D				
P _w in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 10	REFSENS + 6	REFSENS + 13.8				
PInterferer 1 (CW)	dBm		-46					
P _{Interferer 2} (Modulated)	dBm		-46					
BWInterferer 2	MHz	BWChannel_CA20	BWChannel_CA	50				
F _{Interferer 1} (Offset)	MHz	-F _{offset} -30 / F _{offset} +30	-2BW _{Channel_CA} / +2BW _{Channel_CA}	-F _{offset} -75 / F _{offset} +75				
F _{Interferer 2} (Offset)	MHz	i unservoo	2*FInterferer 1	i onser i o				
in Table 7.3 NOTE 2: Reference r one sided d A.5.1.1/A.5.	<ul> <li>NOTE 1: The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>NOTE 2: Reference measurement channel is specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).</li> </ul>							
<ul> <li>NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the closest carrier.</li> <li>NOTE 4: The Finterferer 1 (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and Finterferer 2 (offset) is the frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.</li> </ul>								

	Unit	NR CA band	lwidth class
Rx parameter	s	В	С
P _w in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 16	REFSENS + 19
PInterferer 1 (CW)	dBm	-46	-46
P _{Interferer 2} (Modulated)	dBm	-46	-46
BWInterferer 2	MHz	5	5
F _{Interferer 1} (Offset)	MHz	-F _{offset} -7.5 / F _{offset} +7.5	-F _{offset} -7.5 / F _{offset} +7.5
F _{Interferer 2} (Offset)	MHz	2*FInterferer 1	2*Finterferer 1
7.3.2 NOTE 2: Refe dyna NOTE 3: The A.3.3 A.5.1 NOTE 4: The interf	.3-3 with rence m mic OCI modulate 3.2 with c .1/A.5.2 interferer 1 erer and entre fre	er shall be set to 4 dB below P _{CMAX_L,f,c} at the mi in P _{CMAX_L,f,c} defined in clause 6.2.4. easurement channel is specified in Annexes A.2 NG Pattern OP.1 FDD/TDD for the DL-signal as ed interferer consists of the Reference measurer one sided dynamic OCNG Pattern OP.1 FDD/TD .1 and the same SCS as the 15 kHz SCS. (offset) is the frequency separation of the centre the centre frequency of the CW interferer and F quency of the carrier closest to the interferer and	2.2, A.2.3, A.3.2, and A.3.3 (with one sided described in Annex A.5.1.1/A.5.2.1). ment channel specified in Annexes A.3.2.2 and DD for the DL-signal as described in Annex e frequency of the carrier closest to the Finterferer 2 (offset) is the frequency separation of

## Table 7.8A.2.0.1-2: Wide band intermodulation parameters for intra-band contiguous CA with $F_{DL_{low}}$ < 2700 MHz and $F_{UL_{low}}$ < 2700 MHz

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## 7.8A.2.0.2 Wide band intermodulation for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, the wide band intermodulation requirements are defined with the uplink configuration in accordance with Table 7.3A.0.2.3-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclause 7.8.2 and 7.8A.2.0.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply for out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\ge 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.8A.2.0.3 Wide band Intermodulation for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the wide band intermodulation requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.8 for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.8.2.3-1 and 7.8.2.3-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

The throughput of each carrier shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

The normative reference for this requirement is TS 38.101-1 [2] clause 7.8A.2.

## 7.8A.2.1 Wide band Intermodulation for CA (2DL CA)

## 7.8A.2.1.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8A.2.1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 2DL CA.

7.8A.2.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.8A.2.0.

- 7.8A.2.1.4 Test description
- 7.8A.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.8A.2.1.4.1-1, 7.8A.2.1.4.1-2 or 7.8A.2.1.4.1-3. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

### Table 7.8A.2.1.4.1-1: Test configuration table for Intra-band contiguous CA

	Default Conditions								
Test E	Environment as specified		Normal						
	subclause 4.1								
Test F	- requencies as specified	l in TS 38.508-1	Mid range						
[5] sul	bclause 4.3.1		_						
Test C	CC Combination setting	(N _{RB_agg} ) as	Highest NRB_ag	99					
	ied in Table 5.5A.1-1 fo		NOTE 3						
-	guration across bandwic	th combination							
	upported by the UE.								
Test S	SCS as specified in Tab		Highest						
			Test Parameter	rs					
	Downlii	nk Configuration		Uplink Config	uration				
Test	CC	PCC RB	SCC RB	CC	PCC RB				
				Mod'n	alleastian				
ID	Mod'n	allocation	allocation	INIOU II	allocation				
1D 1	Mod'n CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²				
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹		REFSENS ²				
1 NOTE	CP-OFDM QPSK 1: Full RB allocation s	Full RB ¹ shall be used per	Full RB ¹ each SCS and c	DFT-s-OFDM QPSK	REFSENS ² able 7.3.2.4.1-2.				
1 NOTE	CP-OFDM QPSK 1: Full RB allocation s	Full RB ¹ shall be used per	Full RB ¹ each SCS and c	DFT-s-OFDM QPSK channel BW as specified in T	REFSENS ² able 7.3.2.4.1-2.				
1 NOTE	CP-OFDM QPSK 1: Full RB allocation s 2: REFSENS refers to Table 7.3.2.4.1-3. 3: If the UE supports	Full RB ¹ shall be used per o the single carrie multiple CC Com	Full RB ¹ each SCS and c r Uplink RB allo binations in the	DFT-s-OFDM QPSK channel BW as specified in T cation for reference sensitivi CA Configuration with the sa	REFSENS ² Table 7.3.2.4.1-2. ty according to				
1 NOTE NOTE	CP-OFDM QPSK 1: Full RB allocation s 2: REFSENS refers to Table 7.3.2.4.1-3. 3: If the UE supports the combination wi	Full RB ¹ shall be used per o the single carrie multiple CC Com th the highest NR	Full RB ¹ each SCS and c r Uplink RB allo binations in the B_PCC is tested	DFT-s-OFDM QPSK channel BW as specified in T cation for reference sensitivi CA Configuration with the sa d.	REFSENS ² Table 7.3.2.4.1-2. ty according to the NRB_agg, only				
1 NOTE NOTE	CP-OFDM QPSK 1: Full RB allocation s 2: REFSENS refers to Table 7.3.2.4.1-3. 3: If the UE supports the combination wi 4: In a band where U	Full RB ¹ shall be used per o the single carrie multiple CC Com th the highest NR E supports 4Rx, t	Full RB ¹ each SCS and c r Uplink RB allo binations in the B_PCC is tested he test shall be	DFT-s-OFDM QPSK channel BW as specified in T cation for reference sensitivi CA Configuration with the sa	REFSENS ² Table 7.3.2.4.1-2. ty according to me NRB_agg, only ennas ports				

	Default Conditions							
Test E	Environment as specified	d in TS 38.508-	Normal					
1 [5] s	ubclause 4.1							
Test F	requencies as specified	l in TS 38.508-1	NOTE 4					
[5] sub	oclause 4.3.1							
	CC Combination setting		Highest NRB_ag	19				
	ied in Table 5.5A.3.1-1		NOTE 5					
	guration across bandwid	th combination						
	upported by the UE.							
Test S	SCS as specified in Tabl		Highest					
			Test Parameter	-				
		nk Configuration		Uplink Config				
Test	CC	PCC RB	SCC RB	CC	PCC RB			
ID	Mod'n	allocation	allocation	Mod'n	allocation			
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²			
				channel BW as specified in 1				
NOTE		o the single carrie	r Uplink RB allo	cation for reference sensitivi	ty according to			
	Table 7.3.2.4.1-3.							
NOTE				performed only with 4Rx ant				
connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.								
NOTE	NOTE 4: Test frequency is set to Mid Range PCC and SCC with exceptions defined in Table 7.3A.2.4.1-1. For NR band n28, 30MHz test channel bandwidth is tested with Low range test frequencies.							
NOTE								
NOTE				CA Configuration with the sa	ame N _{RB_agg} , only the			
	combination with th	ne nignest NRB_F	CU IS TESTED.					

## Table 7.8A.2.1.4.1-2: Test configuration table for Inter-band CA

## Table 7.8A.1.4.1-3: Test configuration table for Intraband non-contiguous CA

	Default Conditions								
Test E	Environment as specified	d in TS 38.508-	Normal						
1 [5] s	subclause 4.1								
	requencies as specified	l in TS 38.508-1	NOTE 1						
	bclause 4.3.1								
	CC Combination setting		Highest NRB_ag	_{ig} , NOTE 1, NOTE 3					
	ied in Table 5.5A.2-1 for								
	guration across bandwid	th combination							
	upported by the UE.								
Test S	SCS as specified in Tabl	e 5.3.5-1	Highest						
			Test Parameter	ſS					
	Downlir	nk Configuration		Uplink Config	uration				
Test	CC	PCC RB	SCC RB	CC	PCC RB				
ID	Mod'n	allocation	allocation	Mod'n	allocation				
1	CP-OFDM QPSK	NOTE 1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1				
NOTE				e defined in Table 7.3A.1.4.1					
NOTE	NOTE 2: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports								
	connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.								
NOTE				CA Configuration with the sa	me $N_{RB_{agg}}$ , only the				
	combination with th	ne highest NRB_F	PCC is tested.						

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.8A.2.1.4.1-1, Table 7.8A.2.1.4.1-2 or Table 7.8A.2.1.4.1-3.
- 5. Propagation conditions are set according to Annex B.0.

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- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.8A.2.1.4.3.

7.8A.2.1.4.2 Test procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.8A.2.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.8A.2.1.4.1-1, 7.8A.2.1.4.1-2 or 7.8A.2.1.4.1-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.8A.2.1.4.1-1, 7.8A.2.1.4.1-2 or 7.8A.2.1.4.1-3 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 6. Set the Interfering signal levels to the values as defined in Table 7.8A.2.1.5.1-1, 7.8A.2.1.5.1-2, 7.8A.2.1.5.3-1 or 7.8A.2.1.5.3-2 and frequency below the CA Band for intra-band CA, or below the SCC's operating band for inter-band CA according to Table 7.8A.2.1.5.1-1, 7.8A.2.1.5.1-2, 7.8A.2.1.5.3-1 or 7.8A.2.1.5.3-2, using a modulated interferer bandwidth as defined in Annex D of the present document. For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1, P_{interferer} power defined in Table 7.8A.2.1.5.3-1 and 7.8A.2.1.5.3-2 is increased by the amount given by ΔR_{IB,c} in Table 7.3A.0.3.2.1-1.
- 7. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.8A.2.1.5.1-1, 7.8A.2.1.5.1-2, 7.8A.2.1.5.3-1 or 7.8A.2.1.5.3-2. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.8A.2.1.5.1-1, 7.8A.2.1.5.1-2, 7.8A.2.1.5.3-1 or 7.8A.2.1.5.3-2 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA. Measure the average throughput of both carriers for a duration sufficient to achieve statistical significance according to Annex H.2A for intra-band CA.
- 9. Repeat steps from 6 to 8, using an interfering signal above the CA Band for intra-band CA, or above the SCC's operating band for inter-band CA at step 6.
- 10. For Inter-band CA: Switch the SCell into PCell and repeat steps 1 to 9, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

### 7.8A.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

## 7.8A.2.1.5 Test requirement

## 7.8A.2.1.5.1 Wide band intermodulation for Intra-band contiguous CA

The throughput shall be  $\geq$  95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8A.2.1.5.1-1 or 7.8A.2.1.5.1-2 for the specified wanted signal mean power in the presence of two interfering signals.

## Table 7.8A.2.1.5.1-1: Wide band intermodulation parameters for intra-band contiguous CA with $F_{DL_low}$ $\geq$ 3300 MHz and $F_{UL_low} \geq$ 3300 MHz

Dry morrow		l lucito	NR CA band	dwidth class		
Rx parar	neter	Units	В	С		
Bandw	P _w in Transmission Bandwidth Configuration, per CC		REFSENS + 10	REFSENS + 6		
PInterferer 1	(CW)	dBm	-4	46		
P _{Interfer} (Modula	0.5	dBm	-2	46		
BWInterf	erer 2	MHz	20	BWChannel_CA		
F _{Interfer} (Offse		MHz	-F _{offset} -30 / F _{offset} +30	-2BW _{Channel_CA} / +2BW _{Channel_CA}		
F _{Interfer} (Offse		MHz	2*FInterferer 1			
in ⁻ NOTE 2: Re on	Table 7.3.2 ference me	.3-3 with Po asurement amic OCN0	et to 4 dB below $P_{CMAX_L,f,c}$ at the mi $_{MAX_L,f,c}$ defined in clause 6.2.4. channel is specified in Annexes A.2 G Pattern OP.1 FDD/TDD for the DL	2.2, A.2.3, A.3.2, and A.3.3 (with		
<ul> <li>A.5.1.1/A.5.2.1).</li> <li>NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the closest carrier.</li> <li>NOTE 4: The Finterferer 1 (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and Finterferer 2 (offset) is the frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the cent</li></ul>						

By parameter	Unit	NR CA band	dwidth class				
Rx parameter	S	В	С				
P _w in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 16	REFSENS + 19				
PInterferer 1 (CW)	dBm	-46	-46				
P _{Interferer 2} (Modulated)	dBm	-46	-46				
BWInterferer 2	MHz	5	5				
F _{Interferer 1} (Offset)	MHz	-F _{offset} -7.5 / F _{offset} +7.5	-F _{offset} -7.5 / F _{offset} +7.5				
F _{Interferer 2} (Offset)	MHz	2*FInterferer 1	2*Finterferer 1				
		er shall be set to 4 dB below $P_{CMAX_L,f,c}$ at the mi	nimum UL configuration specified in Table				
NOTE 2: Refe dyna NOTE 3: The A.3.3	rence m mic OCI modulate 3.2 with c	n P _{CMAX_L,f,c} defined in clause 6.2.4. easurement channel is specified in Annexes A.2 NG Pattern OP.1 FDD/TDD for the DL-signal as ed interferer consists of the Reference measurer one sided dynamic OCNG Pattern OP.1 FDD/TD .1 and the same SCS as the 15 kHz SCS.	described in Annex A.5.1.1/A.5.2.1). ment channel specified in Annexes A.3.2.2 and				
<ul> <li>A.5.1.1/A.5.2.1 and the same SCS as the 15 kHz SCS.</li> <li>NOTE 4: The F_{interferer 1} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and F_{interferer 2} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.</li> </ul>							

## Table 7.8A.2.1.5.1-2: Wide band intermodulation parameters for intra-band contiguous CA with $F_{DL_low}$ < 2700 MHz and $F_{UL low}$ < 2700 MHz

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## 7.8A.2.1.5.2 Wide band intermodulation for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the wide band intermodulation requirements are defined with the uplink configuration in accordance with Table 7.3A.0.2.3-1. For this uplink configuration, the UE shall meet the requirements for each carrier as specified in subclause 7.8.2 for each component carrier respectively. The requirements apply for out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters defined in Table 7.8A.2.1.5.3-1 or 7.8A.2.1.5.3-2.

## 7.8A.2.1.5.3 Wide band intermodulation for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the wide band intermodulation requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested.

The throughput of each carrier shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters defined in Table 7.8A.2.1.5.3-1 or 7.8A.2.1.5.3-2.

Rx parameter	Units					C	hannel b	andwidt	h				
-		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
P _w in					REF	SENS +	channel l	bandwidt	h specific	value b	elow		
Transmission Bandwidth Configuration, per CC	dBm	6	6	7	9	10	11	12	13	14	15	15	16
P _{Interferer 1} (CW)	dBm						-4	6					
P _{Interferer 2} (Modulated)	dBm						-4	6					
BWInterferer 2	MHz						Ę	5					
Finterferer 1	MHz						-BW/2						
(Offset)							/ D\A//2						
FInterferer 2	MHz						+BW/2 2*FInte						
(Offset)								erferer 1					
NOTE 1: The tra	ansmitter s			below Po	CMAX_L,f,c &	at the min	imum UL	. configur	ation spe	cified in	Table 7.	.3.2.3-3 w	vith
	nce meas									with one	e sided d	ynamic C	CNG
NOTE 3: The m	odulated in	nterferer	TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1). rferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz										
NOTE 4: The Fill centre	nterferer 1 (Off	of the C		er and F	interferer 2 (	offset) is	the frequ	iency sep	paration c				

## Table 7.8A.2.1.5.3-1: Wide band intermodulation parameters for NR bands with $F_{DL_high}$ < 2700 MHz and $F_{UL_high}$ < 2700 MHz

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.8A.2.1.5.3-1 and 7.8A.2.1.5.3-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

carrier closest to the interferer and the centre frequency of the modulated interferer.

Rx	Unit	Channel bandwidth								
parameter	S	10	20 MHz	60 MHz	80 MHz	90	100			
-	•	MHz	MHz	MHz						
P _w in	_				REFS	SENS + 6				
Transmissior Bandwidth	dBm									
Configuration										
, per CC										
Pinterferer 1 (CW)	dBm					-46				
P _{Interferer 2} (Modulated)	dBm					-46				
BWInterferer 2	MHz					BW				
Einterferer 1					-:	2BW				
(Offset)	MHz									
						2BW				
F _{Interferer 2} (Offset)	MHz				2 Γ	Interferer 1				
NOTE 1: Th						ninimum UL	configuratio	on specified ir	n Table	
		th P _{CMAX_L,f,c} (								
NOTE 2: Re										
								.5.1.1/A.5.2.1		
								d in Annexes s described ir		
		2.1 and the s					DL-Signal a		Annex	
						tre frequenc	v of the car	rier closest to	the	
NOTE 4: The F _{interferer 1} (offset) is the frequency separation of the centre frequency of the carrier closest interferer and the centre frequency of the CW interferer and F _{interferer 2} (offset) is the frequency										
								/ of the modu		
int	erferer.									

## Table 7.8A.2.1.5.3-2: Wide band intermodulation parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL low} \ge 3300$ MHz

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## 7.8A.2.2 Wide band Intermodulation for CA (3DL CA)

## 7.8A.2.2.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

### 7.8A.2.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 3DL CA.

7.8A.2.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.8A.2.0.

7.8A.2.2.4	Test description
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## 7.8A.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.8A.2.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the

OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

	Default Conditions							
Test E	Environment as specified	d in TS 38.508-	Normal					
1 [5] s	subclause 4.1							
	Frequencies as specified	l in TS 38.508-1	Intra-band cor	ntiguous: Mid range				
[5] su	bclause 4.3.1		Inter-band: NO					
				tiguous + Inter-band: NOTE				
				n-contiguous + Inter-band: N	OTE 3			
	CC Combination setting		Highest NRB_ag	99				
	fied in Tables 5.5A.1-1, s		(NOTE 4)					
	s in clauses 5.5A.3.x for							
	guration across bandwid	Ith combination						
	supported by the UE.		Llighast					
Test	SCS as specified in Tabl		Highest Test Paramete	re l				
	Downlin	nk Configuration		Uplink Config	uration			
Test	CC	PCC RB	SCCs RB	CC	PCC RB			
ID	Mod'n	allocation	allocation	Mod'n	allocation			
	Default Test	Settings for a CA	A nXD Configu	ration (Intra-band contigu	ous)			
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²			
	Default Tes	t Settings for a C	A_nXA-nYA-n	ZA Configuration (Inter-ba	nd)			
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²			
Defau	ult Test Settings for a (	CA_nXC-nYA, CA	A_nYA-nXC, C/	A_nYA-nXB and CA_nXB-n	YA Configurations			
			d contiguous +					
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²			
	Defa			2A)-nYA Configuration				
			non-contiguous					
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²			
				channel BW as specified in 1				
NOTE	Table 7.3.2.4.1-3.	o the single carrie	r Uplink RB allo	cation for reference sensitivi	ty according to			
		auoncios for PC(	C and SCCs and	d Wgap for intra-band non-c	ontiquous aro			
				ing non-exceptional REFSE				
	are used for wide b							
NOTE				CA Configuration with the sa	me NRB add, only			
	the combination wi							
NOTE					ennas ports			
	NOTE 5: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.							

## Table 7.8A.2.2.4.1-1: Test configuration table for CA

## Table 7.8A.2.2.4.1-2: Void

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.8A.2.2.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.8A.2.2.4.3.

### 7.8A.2.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.

- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.8A.2.2.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.8A.2.2.4.1-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.8A.2.2.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 6. Set the Interfering signal levels to the values as defined in Table 7.8A.2.2.5.1-1, 7.8A.2.2.5.1-2, 7.8A.2.2.5.2-1 or 7.8A.2.2.5.2-2 and frequency below the CA Band for intra-band CA, or below each SCC's operating band for inter-band CA according to Table 7.8A.2.2.5.1-1, 7.8A.2.2.5.1-2, 7.8A.2.2.5.2-1 or 7.8A.2.2.5.2-2, using a modulated interferer bandwidth as defined in Annex D of the present document. For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1, P_{interferer} power defined in Table 7.8A.2.2.5.2-1 and 7.8A.2.2.5.2-2 is increased by the amount given by ΔR_{IB,c} in Table 7.3A.0.3.2.1-1.
- Set the Downlink signal level for PCC and SCCs to the value as defined in Table 7.8A.2.2.5.1-1, 7.8A.2.2.5.1-2, 7.8A.2.2.5.2-1 or 7.8A.2.2.5.2-2. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.8A.2.2.5.1-1, 7.8A.2.2.5.1-2, 7.8A.2.2.5.2-1 or 7.8A.2.2.5.2-2 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCCs for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA. Measure the average throughput of all carriers for a duration sufficient to achieve statistical significance according to Annex H.2A for intra-band CA.
- 9. Repeat steps from 6 to 8, using an interfering signal above the CA Band for intra-band CA, or above the each SCC's operating band for inter-band CA at step 6.
- 10. For Inter-band CA: Switch the SCell into PCell and repeat steps 1 to 9, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

### 7.8A.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

### 7.8A.2.2.5 Test requirement

### 7.8A.2.2.5.1 Wide band intermodulation for Intra-band contiguous CA

The throughput shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8A.2.2.5.1-1 or 7.8A.2.2.5.1-2 for the specified wanted signal mean power in the presence of two interfering signals.

		N	R CA bandwidth clas	SS			
Rx parameter	Units	В	С	D			
P _w in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 10	REFSENS + 6	REFSENS + 13.8			
PInterferer 1 (CW)	dBm		-46				
P _{Interferer 2} (Modulated)	dBm		-46				
BWInterferer 2	MHz	20	BWChannel_CA	50			
F _{Interferer 1} (Offset)	MHz	-F _{offset} -30 / F _{offset} +30	-2BW _{Channel_CA} / +2BW _{Channel_CA}	-F _{offset} -75 / F _{offset} +75			
F _{Interferer 2} (Offset)	MHz	2*FInterferer 1					
in Table 7.3.2 NOTE 2: Reference me one sided dyr A.5.1.1/A.5.2. NOTE 3: The modulate Annexes A.3. DL-signal as o NOTE 4: The F _{interferer 1}	<ol> <li>The transmitter shall be set to 4 dB below P_{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with P_{CMAX_L,f,c} defined in clause 6.2.4.</li> <li>Reference measurement channel is specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).</li> <li>The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the closest carrier.</li> </ol>						
frequency sep	paration of t	entre frequency of the CN ne centre frequency of the nodulated interferer.					

# Table 7.8A.2.2.5.1-1: Wide band intermodulation parameters for intra-band contiguous CA with $F_{DL_low}$ $\geq$ 3300 MHz and $F_{UL_low} \geq$ 3300 MHz

# Table 7.8A.2.2.5.1-2: Wide band intermodulation parameters for intra-band contiguous CA with $F_{DL_low}$ < 2700 MHz and $F_{UL_low} < 2700$ MHz

Unit	NR CA bandwidth class						
S	В	С					
dBm	REFSENS + 16	REFSENS + 22					
dBm	-46	-46					
dBm	-46	-46					
MHz	5	5					
MHz	-F _{offset} -7.5 / F _{offset} +7.5	-F _{offset} -7.5 / F _{offset} +7.5					
MHz	2*FInterferer 1	2*FInterferer 1					
3-3 with ence m nic OCN nodulate 2 with c 1/A.5.2 interferer 1 erer and	n P _{CMAX_L,f,c} defined in clause 6.2.4. easurement channel is specified in Annexes A.2 NG Pattern OP.1 FDD/TDD for the DL-signal as ed interferer consists of the Reference measurer one sided dynamic OCNG Pattern OP.1 FDD/TD .1 and the same SCS as the 15 kHz SCS. (offset) is the frequency separation of the centre I the centre frequency of the CW interferer and F	2.2, A.2.3, A.3.2, and A.3.3 (with one sided described in Annex A.5.1.1/A.5.2.1). ment channel specified in Annexes A.3.2.2 and DD for the DL-signal as described in Annex e frequency of the carrier closest to the Finterferer 2 (offset) is the frequency separation of					
	s dBm dBm dBm MHz MHz MHz mHz ansmitt 3-3 with ence m nic OCN nodulate 2 with c 1/A.5.2 interferer 1 erer anc	s       B         dBm       REFSENS + 16         dBm       -46         dBm       -46         MHz       5         MHz       /         Foffset-7.5         MHz       2*Finterferer 1         ransmitter shall be set to 4 dB below PCMAX_L.f.c at the millow specified in clause 6.2.4.         ence measurement channel is specified in Annexes A.2         nic OCNG Pattern OP.1 FDD/TDD for the DL-signal as nodulated interferer consists of the Reference measurer         2 with one sided dynamic OCNG Pattern OP.1 FDD/TD         1/A.5.2.1 and the same SCS as the 15 kHz SCS.         interferer 1 (offset) is the frequency separation of the centre per and the centre frequency of the CW interferer and Feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest to the interferer and feature frequency of the carrier closest					

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## 7.8A.2.2.5.2 Wide band intermodulation for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the wide band intermodulation requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested.

The throughput of each carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters defined in Table 7.8A.2.2.5.2-1 or 7.8A.2.2.5.2-2.

Table 7.8A.2.2.5.2-1: Wide band intermodulation parameters for NR bands with F _{DL_high} < 2700 MHz
and F _{UL_high} < 2700 MHz

Rx parameter	Units	Channel bandwidth												
		5	10	15	20	25	30	40	50	60	80	90	100	
D in		MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	
P _w in Transmission									1					
Bandwidth	dBm													
Configuration		6	6	7	9	10	11	12	13	14	15	15	16	
per CC														
PInterferer 1 (CW)	dBm		-46											
P _{Interferer 2} (Modulated)	dBm	-46												
BWInterferer 2	MHz	5												
FInterferer 1 MHz -BW/2 - 7.5														
(Offset)						/	/							
			+BW/2 + 7.5											
FInterferer 2 MHz				2*FInterferer 1										
1	(Offset)   OTE 1: The transmitter shall be set to 4dB below P _{CMAX_L,f,c} at the minimum UL configuration specified in Table 7.3.2.3-3 with								14					
				Delow P	CMAX_L,f,c	at the min		. configur	ation spe	cified in	Table 7	.3.2.3-3 0	lith	
NOTE 2: Refer	(_L,f,c define ence meas rn OP.1 FD	urement	channel is							with one	sided d	ynamic C	CNG	
NOTE 3: The r one s SCS.	ided dynan													
centr	NOTE 4: The F _{interferer 1} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and F _{interferer 2} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.													

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1,  $P_{interferer}$  power defined in Table 7.8A.2.2.5.2-1 and 7.8A.2.2.5.2-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

#### Channel bandwidth Unit Rx 20 100 10 40 50 60 80 90 parameter s MHz MHz MHz MHz MHz MHz MHz MHz P_w in REFSENS + 6 Transmission dBm Bandwidth Configuration per CC PInterferer 1 -46 dBm (CW) PInterferer 2 -46 dBm (Modulated) MHz BW BWInterferer 2 -2BW FInterferer 1 MHz 1 (Offset) +2BW FInterferer 2 2*FInterferer 1 MHz (Offset) NOTE 1: The transmitter shall be set to 4dB below PCMAX_L,f,c at the minimum UL configuration specified in Table 7.3.2.3-3 with PCMAX L.f.c defined in clause 6.2.4. Reference measurement channel is specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided NOTE 2: dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1). NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the wanted signal. NOTE 4: The Finterferer 1 (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and Finterferer 2 (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

## Table 7.8A.2.2.5.2-2: Wide band intermodulation parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL_{low}} \ge 3300$ MHz

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## 7.8A.2.3 Wide band Intermodulation for CA (4DL CA)

## 7.8A.2.3.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

## 7.8A.2.3.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that supports 4DL CA.

7.8A.2.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.8A.2.0.

## 7.8A.2.3.4 Test description

## 7.8A.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR CA configurations specified in clause 5.5A. All of these configurations shall be tested with applicable test parameters for each CA configuration, are shown in Table 7.8A.2.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3 respectively. The details of the

OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Default Conditions									
	nvironment as specified	l in TS 38.508-	Normal						
	ubclause 4.1								
	requencies as specified	in TS 38.508-1	Inter-band : Mid range for PCC and SCCs (NOTE 5)						
[5] sub	clause 4.3.1		Intra-band contiguous + Inter-band: Mid range for PCC and						
			SCCs (NOTE 5)						
			Intra-band non-contiguous + Inter-band: Mid range for PCC						
			and SCCs with maxWGap for Intra-band non-contiguous (NOTE 5)						
Test C	C Combination setting	(NRB_agg) as	Highest N _{RB_agg}						
	ed in Tables 5.5A.1-1, §		NOTE 3						
	in clauses 5.5A.3.x for								
	uration across bandwid	th combination							
	upported by the UE.								
Test S	CS as specified in Tabl		Highest						
	Test Parameters								
		k Configuration		Uplink Configuration					
Test	CC	PCC RB	SCCs RB	CC	PCC RB				
ID	Mod'n	allocation	allocation	Mod'n	allocation				
1	CP-OFDM QPSK	Full RB ¹	Full RB ¹	DFT-s-OFDM QPSK	REFSENS ²				
				channel BW as specified in T					
NOTE	2: REFSENS refers to	the single carrie	r Uplink RB allo	cation for reference sensitivi	ty according to				
Table 7.3.2.4.1-3.									
NOTE 3: If the UE supports multiple CC Combinations in the CA Configuration with the same NRB_agg, only									
the combination with the highest NRB_PCC is tested.									
NOTE 4: In a band where UE supports 4Rx, the test shall be performed only with 4Rx antennas ports									
connected and 4Rx REFSENS requirement (Table 7.3.2.5-2) is used in the test requirements.									
NOTE 5: For NR band n28, 30MHz test channel bandwidth is tested with Low range test frequencies.									

Table 7.8A.2.3.4.1-1: Test configuration table for Inter-ban	d CA
--------------------------------------------------------------	------

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.4.7 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.
- 4. The DL and UL Reference Measurement Channels are set according to Table 7.8A.2.3.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in State RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.8A.2.3.4.3.7.8A.2.3.4.2Test procedure
- 1. Configure SCCs according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCCs as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 7.8A.2.3.4.3.
- 3. SS activates SCCs by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133[19], clause 9.3).
- 4. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.8A.2.3.4.1-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
- 5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.8A.2.3.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

- 6. Set the Interfering signal levels to the values as defined in Table 7.8A.2.3.5.2-1 or Table 7.8A.2.3.5.1-2 and frequency below each SCC's operating band for inter-band CA according to Table 7.8A.2.3.5.2-1 or Table 7.8A.2.3.5.1-2, using a modulated interferer bandwidth as defined in Annex D of the present document. For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1, P_{interferer} power defined in Table 7.8A.2.3.5.1-1 and 7.8A.2.3.5.1-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.
- 7. Set the Downlink signal level for PCC and SCCs to the value as defined in Table 7.8A.2.3.5.2-1 or Table 7.8A.2.3.5.1-2. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.8A.2.3.5.2-1 or Table 7.8A.2.3.5.1-2 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 8. Measure the average throughput of SCCs for a duration sufficient to achieve statistical significance according to Annex H.2A for inter-band CA.
- 9. Repeat steps from 6 to 8, using an interfering signal above the each SCC's operating band for inter-band CA at step 6.
- 10. For Inter-band CA: Switch the SCell into PCell and repeat steps 1 to 9, except for operating bands without uplink band.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

### 7.8A.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.8A.2.3.5 Test requirement

## 7.8A.2.3.5.1 Wide band intermodulation for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the wide band intermodulation requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested.

The throughput of each carrier shall be  $\ge 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters defined in Table 7.8A.2.3.5.1-1 or 7.8A.2.3.5.1-2.

**Rx parameter** 

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#### Table 7.8A.2.3.5.1-1: Wide band intermodulation parameters for NR bands with $F_{DL_{high}}$ < 2700 MHz and $F_{UL_high} < 2700 \text{ MHz}$ Channel bandwidth Units 10 MU 50 ML 5 15 20 25 30 40 60 80 90 .... .... .... . . . . ла Ць

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		MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
P _w in					REFS	ENS + cl	nannel b	andwidth	n specifie	c value	below		
Transmission Bandwidth Configuration, per CC	dBm	6	6	7	9	10	11	12	13	14	15	15	16
P _{Interferer 1} (CW)	dBm						-4	6					
P _{Interferer 2} (Modulated)	dBm						-4	6					
BWInterferer 2	MHz						5						
F _{Interferer 1} (Offset)	MHz		-BW/2 – 7.5 / +BW/2 + 7.5										
F _{Interferer 2} (Offset)	MHz						2*FInte	erferer 1					
NOTE 1: The tra	nsmitter s			below P	CMAX_L,f,c &	at the min	imum UL	configur	ation spe	cified in	Table 7.	3.2.3-3 w	/ith
		asurement channel is specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG DD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).											
NOTE 3: The mo	odulated in	nterferer		of the Re	ference r	neasuren	nent char	nel spec	ified in Ar				

NOTE 4: The Finterferer 1 (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and Finterferer 2 (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

For the UE which supports inter-band CA configuration in Table 7.3A.0.3.2.1-1, P_{interferer} power defined in Table 7.8A.2.3.5.1-1 and 7.8A.2.3.5.1-2 is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.0.3.2.1-1.

Rx	Unit				Channe	bandwidth					
parameter	S	10	20	40	50	60	80	90	100		
_	3	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz		
P _w in					REFS	SENS + 6					
Transmission	-ID										
Bandwidth Configuration	dBm										
, per CC											
PInterferer 1						-46					
(CW)	dBm					10					
PInterferer 2	dBm					-46					
(Modulated)											
BWInterferer 2	MHz					BW					
FInterferer 1	MHz				-:	2BW					
(Offset)					-	7 2BW					
FInterferer 2						Interferer 1					
(Offset)	MHz										
NOTE 1: The						ninimum UL	configuratio	on specified ir	n Table		
		th P _{CMAX_L,f,c} (									
								A.3.3 (with on			
								.5.1.1/A.5.2.1			
NOTE 3: The											
		2.1 and the s				I DD Ior the	DL-signal a	s described ir	Annex		
						tre frequenc	v of the car	rier closest to	the		
			offset) is the frequency separation of the centre frequency of the carrier closest to the the centre frequency of the CW interferer and F _{interferer 2} (offset) is the frequency separation of								
								/ of the modu			
	ferer.	. , , , ,	-	-							

# Table 7.8A.2.3.5.1-2: Wide band intermodulation parameters for NR bands with $F_{DL_{low}} \ge 3300$ MHz and $F_{UL low} \ge 3300$ MHz

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# 7.8B Intermodulation characteristics for NR-DC

For inter-band NR-DC configurations, the intermodulation characteristics for the corresponding inter-band CA configuration as specified in clause 7.8A applies.

Note: For NR-DC testing, replace CA by NR-DC, PCC by PCell, and SCC by PSCell in clause 7.8A.

# 7.8D Intermodulation characteristics for UL MIMO

## 7.8D.1 General

Intermodulation response rejection for UL MIMO is a measure of the capability of the receiver of an UE that support UL MIMO to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

## 7.8D.2 Wide band Intermodulation for UL MIMO

#### 7.8D.2.1 Test purpose

Wide band Intermodulation for UL MIMO tests the ability of UE that support UL MIMO to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

An UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

#### 7.8D.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support UL MIMO on FDD bands.

#### 7.8D.2.3 Minimum conformance requirements

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in subclause 7.8 shall be met with the UL MIMO configurations described in sub-clause 6.2D.1. For UL MIMO, the parameter  $P_{CMAX_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.8D.

- 7.8D.2.4 Test description
- 7.8D.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.8D.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

#### Table 7.8D.2.4.1-1: Test Configuration Table

	Default Conditions					
Test Enviro	Test Environment as specified in TS					
38.508-1 [5	5] subclause 4.1					
Test Frequ	encies as specified in T	S	Mid range			
38.508-1 [5	5] subclause 4.3.1					
Test Chan	nel Bandwidths as speci	fied in	Lowest, Mid,	Highest		
TS 38.508	-1 [5] subclause 4.3.1					
Test SCS a	as specified in Table 5.3	.5-1	Highest			
		Т	est Parameter	S		
	Downlink Co	onfigura	tion	Uplink Config	guration	
Test ID	Mod'n	RB	allocation	Mod'n	<b>RB</b> allocation	
1	CP-OFDM QPSK	1	NOTE 1	CP-OFDM QPSK	NOTE 1	
NOTE 1:	NOTE 1: The specific configuration of uplink and downlink are defined in Table 7.3D.2.4.1-1.					
NOTE 2: In a band where UE supports 4R						
	ports connected and 4R	x REFS	ENS requireme	ent (Table 7.3.2.5-2) is us	sed in the test	
	requirements.					

- 1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.6 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.8D.2.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.8D.2.4.3.

7.8D.2.4.2 Test procedure

Same test procedure as specified in 7.8.2.4.2.

#### 7.8D.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX_UL_MIMO.

#### 7.8D.2.5 Test requirement

Same test requirement as specified in 7.8.2.5.

Table 7.8D.2.5-1: Void

# 7.8E Intermodulation characteristics for V2X

## 7.8E.1 General

Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

## 7.8E.2 Wide band Intermodulation for V2X

#### 7.8E.2.0 Minimum conformance requirements

#### 7.8E.2.0.1 Wide band Intermodulation

The wide band intermodulation requirement is defined using modulated NR carrier and a CW signal as interferer 1 and interferer 2 respectively. The throughput shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.8E.2.0.1-1 for NR V2X bands. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

Table 7.8E.2.0.1-1: Wide band intermodulation	parameters for NR V2X
-----------------------------------------------	-----------------------

NR band	Rx parameter	Units		Channel k	bandwidth			
	-		10 MHz	20 MHz	30 MHz	40 MHz		
n38, n47	Power in Transmission	dBm	PREFSENS_V2X + channel bandwidth specific value belo					
	Bandwidth Configuration		6	9	11	12		
	PInterferer 1 (CW)	dBm		-4	16			
	PInterferer 2 (Modulated)	dBm		-4	16			
	BWInterferer 2	MHz	10MHz					
	FInterferer 1 (Offset)	MHz		-BW/2	2 – 15			
					/			
				+BW/2	2 + 15			
	FInterferer 2 (Offset)	MHz	2 * Finterferer 1					
NOTE 2: Th	eference measurement channe le interferer is QPSK modulate efix is used.			ata and refere	nce symbols. N	Normal cyclic		

#### 7.8E.2.0.2 Intermodulation for V2X con-current operation

For the inter-band con-current NR V2X operation, the requirements specified in clause 7.8E.2.0.1 shall apply for the NR sidelink reception in the operating Bands in in Table 5.2E.1-1 and the requirements specified in clause 7.8 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.8E.

#### 7.8E.2.1 Wide band Intermodulation for V2X / non-concurrent operation

FFS

## 7.8E.2.2 Wide band Intermodulation for V2X / con-current operation

FFS

# 7.8F Intermodulation characteristics for shared spectrum channel access

## 7.8F.1 General

Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

## 7.8F.2 Wide band Intermodulation

## 7.8.2.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

## 7.8F.2.2 Test applicability

This test case applies to all types of NR UE release 16 and forward that support NR standalone shared spectrum channel access.

### 7.8F.2.3 Minimum conformance requirements

The wide band intermodulation requirement is defined using a CW carrier and modulated NR signal as interferer 1 and interferer 2 respectively.

Instead of the general wideband intermodulation requirements specified in clause 7.8.2, the throughput shall be  $\geq$  95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8F.2.3-1. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

Rx parameter	Units		Channel	bandwidth				
		20 MHz	40 MHz	60 MHz	80 MHz			
P _w in Transmission Bandwidth Configuration, per CC	dBm	REFSE	REFSENS + channel bandwidth specific value below					
		9	12	13.8	15			
PInterferer 1 (CW)	dBm		-	46				
P _{Interferer 2} (Modulated)	dBm		-	46				
BWInterferer 2	MHz			20				
FInterferer 1 (Offset)	MHz	-BW/2 - 30 / +BW/2 + 30						
F _{Interferer 2} (Offset)	MHz			nterferer 1				
specifie NOTE 2: Refere one sic Annex NOTE 3: The mo Annexe the DL signal.	ed in Tabl nce meas led dynan A.5.1.1/A odulated i es A.3.2.2 -signal as	e 7.3.2-3 with P _{CM} urement channel nic OCNG Pattern .5.2.1). nterferer consists and A.3.3.2 with described in Ann	MAX_L,f,c defined in cl is specified in Ann I OP.1 FDD/TDD fo of the Reference n one sided dynamic ex A.5.1.1/A.5.2.1	exes A.2.2, A.3.2, a or the DL-signal as o neasurement chann c OCNG Pattern OF and the same SCS	and A.3.3 (with described in nel specified in P.1 FDD/TDD for as the wanted			
closest to the int	terferer ar	nd the center frequ	uency of the CW in	the center frequence terferer and F _{interfere} sest to the interfere	r 2 (offset) is the			
			he modulated inter					

#### Table 7.8F.2.3-1: Wide band intermodulation parameters for shared spectrum channel access

#### 7.8F.2.4 Test description

#### 7.8F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.8F.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

		De	fault Conditio	ns		
Test Envir	Test Environment as specified in TS					
38.508-1 [	5] subclause 4.1					
Test Frequ	uencies as specified in T	S	Mid range			
38.508-1 [	5] subclause 4.3.1					
Test Chan	nel Bandwidths as speci	fied in	Lowest, Mid,	Highest		
TS 38.508	-1 [5] subclause 4.3.1					
Test SCS	as specified in Table 5.3	.5-1	Highest			
		Т	est Parameter	S		
	Downlink Co	onfigura	tion	guration		
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation	
1	CP-OFDM QPSK	1	NOTE 1	DFT-s-OFDM QPSK	NOTE 1	
		on of upl	ink and downlii	nk are defined in Table 7.	3F.2.4.1-2 and	
	Table 7.3F.2.4.1-3.					
				Il be performed only with		
	ports connected and 4R requirements.	x REFS	ENS requireme	ent (Table 7.3F.2.5-2) is u	used in the test	

#### Table 7.8F.2.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.4.3 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.8F.2.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity NR, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.8F.2.4.3.

#### 7.8F.2.4.2 Test procedure

- 1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.8F.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
- 2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.8F.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
- 3. Set the Downlink signal level to the value as defined in Table 7.8F.2.5-1. Send uplink power control commands to the UE using 1dB power step size to ensure that the UE output power measured by the test system is within the Uplink power control window, defined as -MU to -(MU + Uplink power control window size) dB of the target power level in Table 7.8F.2.5-1 for at least the duration of the Throughput measurement, where:
  - MU is the test system uplink power measurement uncertainty and is specified in Table F.1.3-1 for the carrier frequency f and the channel bandwidth BW
  - Uplink power control window size = 1dB (UE power step size) + 0.7dB (UE power step tolerance) + (Test system relative power measurement uncertainty), where, the UE power step tolerance is specified in TS 38.101-1 [2], Table 6.3.4.3-1 and is 0.7dB for 1dB power step size, and the Test system relative power measurement uncertainty is specified for test case 6.3.4.3 in Table F.1.2-1.
- 4. Set the Interfering signal levels to the values as defined in Table 7.8F.2.5-1 and frequency below the wanted signal.
- 5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

- 6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 4.
- NOTE: The purpose of the Uplink power control window is to ensure that the actual UE output power is no greater than the target power level, and as close as possible to the target power level. The relationship between the Uplink power control window, the target power level and the corresponding possible actual UE Uplink power window is illustrated in Annex F.4.3.

#### 7.8F.2.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with DFT-s-OFDM condition in Table 4.6.3-118 PUSCH-Config.

#### 7.8F.2.5 Test requirement

The throughput shall be  $\ge 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8F.2.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Rx parameter	Units	Channel bandwidth							
		20 MHz	40 MHz	60 MHz	80 MHz				
P _w in Transmission Bandwidth Configuration, per CC	dBm	REFSE	REFSENS + channel bandwidth specific value below						
		9	12	13.8	15				
PInterferer 1 (CW)	dBm		-	-46					
P _{Interferer 2} (Modulated)	dBm		-	-46					
BWInterferer 2	MHz			20					
FInterferer 1	MHz		-BW	/2 - 30					
(Offset)				/					
			+BW	/2 + 30					
FInterferer 2 (Offset)	MHz		2*Fi	nterferer 1					
specific NOTE 2: Refere one sid	ed in Tabl nce meas	e 7.3F.2.4.1-3 with surement channel i nic OCNG Pattern	n P _{CMAX_L,f,c} defined is specified in Ann	at the minimum UL of d in clause 6.2.4. exes A.2.2, A.3.2, a or the DL-signal as	and A.3.3 (with				
Annex	modulated interferer consists of the Reference measurement channel specified in exes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the wanted								
NOTE 4: The Fir closest (offset)	nterferer 1 (Of t to the int is the fre	erferer and the ce	nter frequency of t of the center freq	he center frequency he CW interferer ar juency of the carrier interferer.	nd Finterferer 2				

Table 7.8F.2.5-1: Wide band intermodulation parameters for shared spectrum channel access

# 7.9 Spurious emissions

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

#### 7.9.1 Test purpose

Test verifies the UE's spurious emissions meet the requirements described in clause 7.9.3.

Excess spurious emissions increase the interference to other systems.

#### 7.9.2 Test applicability

This test applies to all types of NR UE release 15 and forward.

#### 7.9.3 Minimum conformance requirements

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 7.9.3-1

Table 7.9.3-1: General receiver spurious emission requirements

Frequency range	Measurement bandwidth	Maximum level	NOTE			
30 MHz ≤ f < 1 GHz	100 kHz	-57 dBm				
$1 \text{ GHz} \leq f \leq 12.75 \text{ GHz}$	1 MHz	-47 dBm				
12.75 GHz $\leq$ f $\leq$ 5 th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	2			
12.75 GHz – 26 GHz	1 MHz	-47 dBm	3			
<ul> <li>12.75 GHz – 26 GHz   1 MHz   -47 dBm   3</li> <li>NOTE 1: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH as defined in Annex C.3.1.</li> <li>NOTE 2: Applies for Band that the upper frequency edge of the DL Band more than 2.69 GHz.</li> <li>NOTE 3: Applies for Band that the upper frequency edge of the DL Band more than 5.2 GHz.</li> </ul>						

The normative reference for this requirement is TS 38.101-1 [2] clause 7.9.

7.9.4 Test description

#### 7.9.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and sub-carrier spacing, are shown in table 7.9.4.1-1. The details of the uplink and downlink reference measurement channels (RMC) are specified in Annexes A.2 and A.3. Configuration of PDSCH and PDCCH before measurement are specified in Annex C.2.

		De	afault Conditio	ns	
Test Envir	onment as specified in T	-	Normal		
	5] subclause 4.1				
	uencies as specified in T	S	Low range, M	lid range, High range (NC	DTE 4)
38.508-1	5] subclause 4.3.1				
	nel Bandwidths as speci	ified in	Highest (NOT	FE 3)	
	3-1 [5] subclause 4.3.1				
Test SCS as specified in Table 5.3.5-1 Highest					
	1		est Parameter	-	
	Downlink Co	-		Uplink Config	
Test ID	Mod'n	RB	allocation	Mod'n	RB allocation
1	N/A		0	N/A	0
				nk are defined in Table 7.	
NOTE 2:				Il be performed only with	
	•	x REFS	ENS requireme	ent (Table 7.3.2.5-2) is us	sed in the test
	requirements.				
NOTE 3:	NOTE 3: For n70, highest test channel bandwidth shall be Highest UL / Highest DL according to				
	asymmetric channel bandwidths specified in clause 5.3.6. OTE 4: For NR band n28, 30MHz test channel bandwidth is tested with Low range and High				
NOTE 4:		HZ TEST C	nannei bandwi	ath is tested with Low rar	ige and High
	range test frequencies.				

#### Table 7.9.4.1-1: Test Configuration Table

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.5.1 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, G.3.1.
- 4. The DL and UL Reference Measurement channels are set according to Table 7.9.4.1-1.
- 5. Propagation conditions are set according to Annex B.0.
- 6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity NR, Connected without release *On*, Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message content are defined in clause 7.5.4.3.

#### 7.9.4.2 Test procedure

- 1. Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission.
- 2. Repeat step 1 for all NR Rx antennas of the UE.

#### 7.9.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

#### 7.9.5 Test requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9.5-1.

Frequency range	Measurement bandwidth	Maximum level	NOTE			
30 MHz ≤ f < 1 GHz	100 kHz	-57 dBm				
$1 \text{ GHz} \leq f \leq 12.75 \text{ GHz}$	1 MHz	-47 dBm				
12.75 GHz $\leq$ f $\leq$ 5 th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	2			
12.75 GHz – 26 GHz	1 MHz	-47 dBm	3			
<ul> <li>NOTE 1: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH as defined in Annex C.3.1.</li> <li>NOTE 2: Applies for Band that the upper frequency edge of the DL Band more than 2.69 GHz.</li> <li>NOTE 3: Applies for Band that the upper frequency edge of the DL Band more than 5.2 GHz.</li> </ul>						

Table 7.9.5-1: General receiver spurious emission requirements

# 7.9A Spurious emissions for CA

## 7.9A.0 Minimum conformance requirements

For inter-band carrier aggregation including an operating band without uplink band, the UE shall meet the Rx spurious emissions requirements specified in subclause 7.9 for each component carrier while all downlink carriers are active.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.9A.3.

## 7.9A.1 Spurious emissions for CA (2DL CA)

#### 7.9A.1.1 Test Purpose

Test verifies the UE's spurious emissions meet the requirements described in clause 7.9A.1.3.

Excess spurious emissions increase the interference to other systems.

#### 7.9A.1.2 Test Applicability

This test case applies to all types of NR UE release 15 and forward that support inter-band 2DL CA with a DL-only band.

#### 7.9A.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.9A.0.

- 7.9A.1.4 Test Description
- 7.9A.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR CA bands specified in Table 5.5A.3-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in Table 7.9A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

#### Table 7.9A.1.4.1-1: Test Configuration Table

			Initial Conditions	5			
Test Environment as specified in TS 38.508-1 [5] subclause 4.1			Normal				
Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1		Low range, Mid	range, High range	e (NOTE 3)			
Test CC Combination setting (N _{RB_agg} ) as specified in Table 5.5A.1-1 for the CA Configuration across bandwidth combination sets supported by the UE.		Highest N _{RB_agg} NOTE 4					
Test SCS as spe	ecified in Table 5.	3.5-1	Highest				
		Test Param	eters for CA Cor	nfigurations			
Ch Configura	ation / N _{RB_agg}	Dov	vnlink Configura	tion	Uplink Configuration		
РСС Nrb	SCCs Nrb	Mod'n	PCC 8 RB allo	& SCC ocation	Mod'n	PCC RB allocation	
100	100	N/A	0	0	N/A	0	
NOTE 2: In a b 4Rx F NOTE 3: For N NOTE 4: If the	and where UE su REFSENS require IR band n28, 30M	pports 4Rx, the te ment (Table 7.3.2 Hz test channel b iple CC Combinat	downlink are defin est shall be perforr 2.5-2) is used in th andwidth is testec tions in the CA Co is tested	ned only with 4R» e test requiremen I with Low range a	c antennas ports ts. and High range to	est frequencies.	

- 1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, in Figure A.3.1.5.2 for TE diagram and section A.3.2 for UE diagram.
- 2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
- 3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, C.2.
- 4. Propagation conditions are set according to Annex B.0.
- 5. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity *NR* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.9A.1.4.3.

#### 7.9A.1.4.2 Test Procedure

- 1. Configure SCC according to Annex C.0, C.1, C.2 for all downlink physical channels.
- 2. The SS shall configure SCC as per TS 38.508-1 [5] clause 5.5.1. Message contents are defined in clause 6.5A.2.2.1.4.3.
- 3. SS activates SCC by sending the activation MAC CE (Refer TS 38.321 [18], clauses 5.9, 6.1.3.10). Wait for at least 2 seconds (Refer TS 38.133 [19], clause9.3).
- 4. Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission. During measurement SS sends no uplink scheduling information to the UE.
- 5. Repeat step 1 for all NR Rx antennas of the UE.

#### 7.9A.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

#### 7.9A.1.5 Test Requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9.5-1.

# 7.9B Spurious emissions for NR-DC

For inter-band NR-DC configurations, the spurious emissions for the corresponding inter-band CA configuration as specified in clause 7.9A applies.

Note: For NR-DC testing, replace CA by NR-DC, PCC by PCell, and SCC by PSCell in clause 7.9A.